

SNELL & WILCOX

ARC 150

Aspect Ratio Converter

Operation & Service Manual



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Aspect Ratio Converter

Operation & Service Manual

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Snell & Wilcox Ltd, Durford Mill, Petersfield, Hampshire, GU31 5AZ, United Kingdom.
Tel: +44(0) 1730 821188. Fax: +44(0) 1730 821199.

Safety Warnings

Always ensure that the unit is properly earthed and power connections correctly made.

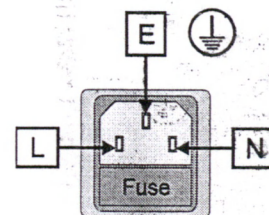
This equipment shall be supplied from a power system providing a **PROTECTIVE EARTH**  connection and having a neutral connection which can be reliably identified.

The power terminals of the IEC mains input connector on the rear panel are identified as shown below:

E = Protective Earth Conductor

N = Neutral Conductor

L = Live Conductor



Power cable supplied for countries other than the USA

The equipment is normally shipped with a power cable with a standard IEC moulded free socket on one end and a standard IEC moulded plug on the other. If you are required to remove the moulded mains supply plug, dispose of the plug immediately in a safe manner. The colour code for the lead is as follows:

GREEN/YELLOW lead connected to E (Protective Earth Conductor)

BLUE lead connected to N (Neutral Conductor)

BROWN lead connected to L (Live Conductor)

Power cable supplied for the USA

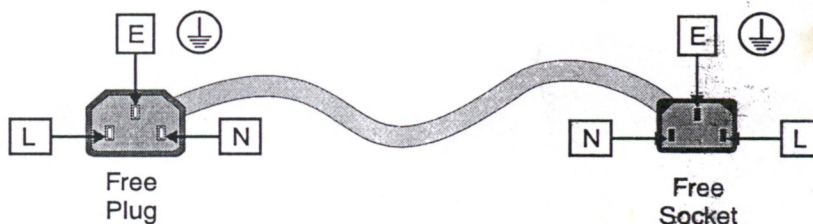
The equipment is shipped with a power cord with a standard IEC moulded free socket on one end and a standard 3-pin plug on the other. If you are required to remove the moulded mains supply plug, dispose of the plug immediately in a safe manner. The colour code for the lead is as follows:

GREEN lead connected to E (Protective Earth Conductor)

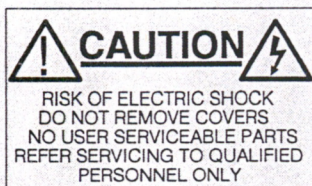
WHITE lead connected to N (Neutral Conductor)

BLACK lead connected to L (Live Conductor)

The terminals of the IEC mains supply lead are identified as shown opposite:



Note that for equipment that is not fitted with a mains power switch, to comply with BS60950 Clauses 1.7.2 and 2.6.9, the power outlet supplying power to the unit should be close to the unit and easily accessible.



Warnings

Voltages within this unit can be lethal under certain circumstances. Where power is required to be connected to the unit during servicing great care must be taken to avoid contact with these voltages.

Maintenance should only be carried out by suitably qualified personnel.

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EMC Standards

This unit conforms to the following standards:

Electromagnetic Compatibility-Generic Immunity Standard BS EN 50082-1:1992

The European Standard EN 50082-1:1992 has the status of a British Standard and is related to European Council Directive 89/336/EEC dated 3rd May 1989.

Electromagnetic Compatibility-Generic Emission Standard BS EN 50081-1:1992

The European Standard EN 50081-1:1992 has the status of a British Standard and is related to European Council Directive 89/336/EEC dated 3rd May 1989.

Safety Standards

This unit conforms to EN60950:1992 as ammended by ammendment A1(May 1993) and ammendment A2(March 1994). Specification for safety of technology equipment, including electrical business equipment.

EMC Performance of Cables and Connectors

Snell & Wilcox products are designed to meet or exceed the requirements of the appropriate European EMC standards. In order to achieve this performance in real installations it is essential to use cables and connectors with good EMC characteristics.

All signal connections (including remote control connections) shall be made with screened cables terminated in connectors having a metal shell. The cable screen shall have a large-area contact with the metal shell.

COAXIAL CABLES

Coaxial cables connections (particularly serial digital video connections) shall be made with high-quality double-screened coaxial cables such as Belden 8281 or BBC type PSF1/2M.

D-TYPE CONNECTORS

D-type connectors shall have metal shells making good RF contact with the cable screen. Connectors having "dimples" which improve the contact between the plug and socket shells, are recommended.

Packing List

The unit is supplied in a dedicated packing carton provided by the manufacturer and should not be accepted if delivered in inferior or unauthorised materials. Carefully unpack the carton and check for any shipping damage or shortages.

Any shortages or damage should be reported to the supplier immediately.

Enclosures:

- ARC 150 Aspect Ratio Converter
- Power cable
- Operating and Service Manual

Manufacturers Notice

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Reproduction or disassembly of embedded computer programs or algorithms prohibited.

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Microsoft Windows™

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Software Version Amendments

Notes about Version Fitted

This machine is shipped with version 1.03 of the firmware.

Specific limitations of this version are as follows:

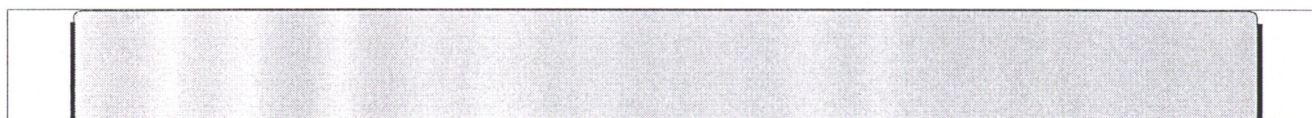
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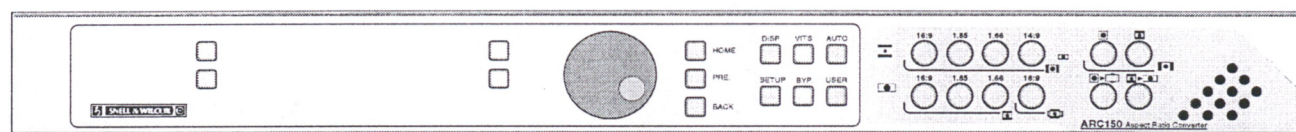
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Introduction

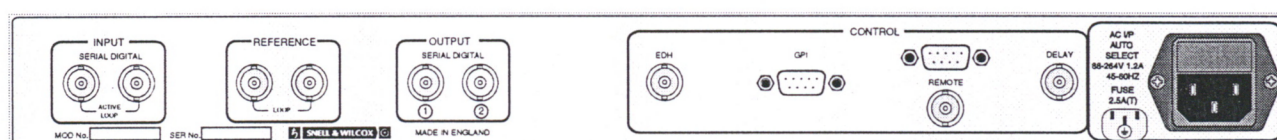
Aspect Ratio Converter ARC 150



Blank Front Panel Version



Active Control Panel Version



Rear View

The ARC 150 is a compact Broadcast-Quality Aspect Ratio Converter with serial digital inputs and outputs. It will aspect ratio convert in both directions, e.g. 16:9 to 4:3 or 4:3 to 16:9, and allows the picture area required for transmission to be selected from the input picture.

There are twelve preset conversion ratios plus ratios set up by the user. The user ratios can be stored in twelve memories and are quickly pushbutton selected when required for use.

The aspect ratio can also be remotely controlled either via an RS-422 port, or as an option, from contact closures via a General Purpose Interface (GPI).

The ARC 150 is designed to fit in Continuity Suites, Studio's, Outside Broadcast Vans, etc. It facilitates the production of master tapes for broadcast using PAL+, D2MAC and digital transmissions. It also facilitates post production and presentation of tapes mastered in 16:9 format through the current 4:3 format transmission system.

The ARC 150 is a compact 1RU high unit for location on the desktop or in a 19-in. rack. It will operate in 525 and 625 line systems. The unit is available with full front panel controls, or with internal switch controls and a blank front panel.

Specifications

Features

Signal Inputs

Serial Digital	1 Serial D1 525 or 625 via BNC loop-through connectors
Analog Reference	1 via BNC loop-through connectors
Remote Control	9 way D-Type
GPI	9 way D-Type
Network Control	RollCall via BNC connector

Signal Outputs

Serial	2 sets of Serial Digital D1 via BNC connectors
Delay	1 Output via BNC connector

Control Functions

Blanking:	Controls blanking on both input and output
Display	Position, Size and Aspect Ratio
Genlock	Source and Timing
Enhanced Line 23 Setup	Input/Output Setup
Video Index	Input/Output Setup
Memory	Stores settings in memory and allows recall of memorised settings
VITS	VITS blanking
SETUP	Audio, Clipping, Freeze, Gamut Limiting, GPI (if option fitted), GPI Program, Input Loss, Input Standard (625, 525), Process, Test Pattern, Field Painting Mode, Reference and line 21 video (525 line systems).
BYPASS	Non-interpolated output
USER	User display memories
Output Aspect Ratio	Letterbox: 16:9, 1.85:1, 1.66:1, 14:9. Full Screen: 16:9, 1.85:1, 1.66:1, 16:9 anamorphic 4:3 Curtains, 14:9 Curtains, 4:3 Full Width, 16:9 full Width

Specifications

Input Standard	525/625 line
Serial Input Return Loss	better than 15 dB to 270 MHz
Serial Output Return Loss	better than 15 dB to 270 MHz
Reference Inputs	Black Burst or Composite Video
Reference Input Return Loss	better than 35 dB to 5.8 MHz
Reference Line Standard	525/625 Line
Composite or Black Burst Reference Level	Standard level ± 6 dB (burst not processed)

Power

Input Voltage Range	90 V to 260 V 45/90 Hz
Consumption	75 W maximum
Mains Fuse Rating	1 A

Mechanical

Temperature Range	0 to 40° C operating
Case Type	1U Rack Mounting
Dimensions	483 mm x 530 mm x 44 mm (w,d,h)
Weight	7 kg

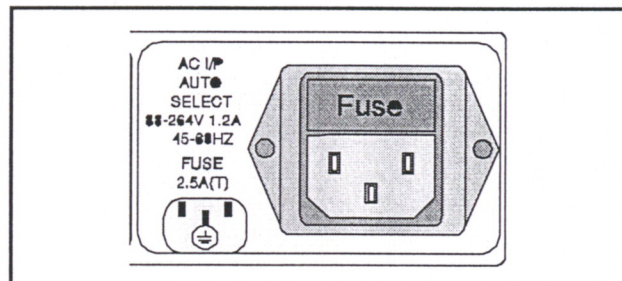
Installation

POWER CONNECTIONS

Power Supply

Mains power is supplied to the unit via a filtered IEC connector with integral fuse holder. The fuse rating is 2.5 A (T).

The unit automatically senses the supply voltage in the ranges 90V-132V and 176V-264V and sets itself up accordingly. No voltage adjustment procedure is required.



ENVIRONMENT

The unit is ruggedly constructed to meet the normal environmental requirements. It is important that there is a free flow of air at both sides of the unit to dissipate the heat produced during operation. Installations should be designed to allow for this.

If the unit is to be rack mounted, first open the front panel by lifting up the the two levers at right and left of the panel, hinge the panel down and

pull it forward. The fixing "ears" behind the panel will be revealed and the unit can be mounted in the rack. Refit or close the front panel by pushing it back into position (the levers will click into place).

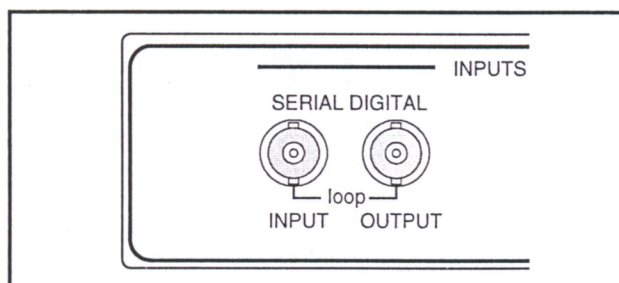
The rear of the base includes additional fixing holes on either side to allow a rear support to be added.

Installation

REAR PANEL CONNECTIONS

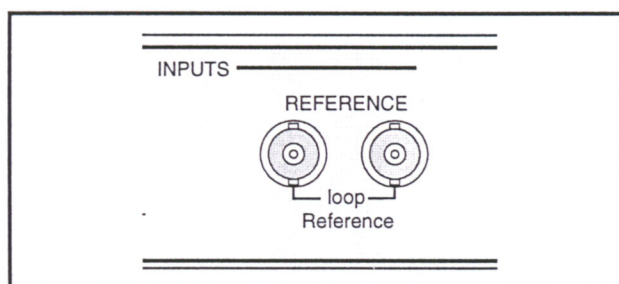
Digital Input

A BNC connector is provided for the serial digital input, with an active loop-through BNC connector also fitted.



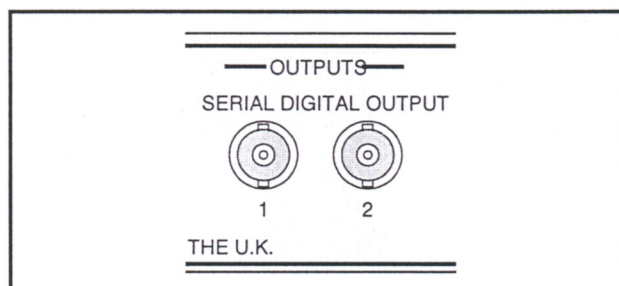
Reference Input (Genlock)

A pair of loop-through BNCs are provided for the analogue reference.



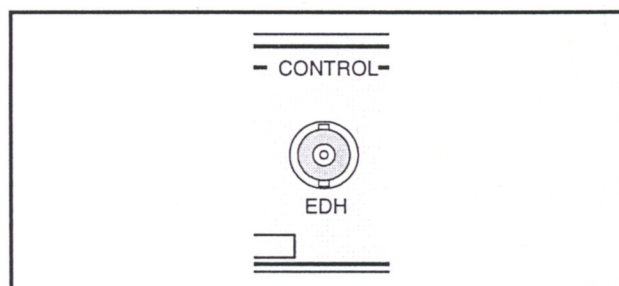
Digital Output

Two BNC connectors are provided for the serial digital outputs.



EDH Output

A BNC connector provides the SMPTE EDH output for fault monitoring. *Not yet implemented*



Installation

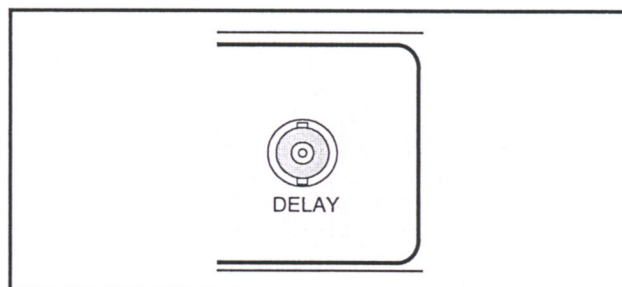
Delay Output

Because the ARC150 contains a synchroniser, the delay through the ARC150 depends upon the timing relationship between the input video, any external reference and, the setting of vertical genlock timing.

If the input and output video are co-timed, then the delay through the ARC150 is four fields (80mS for 625 line systems and 66.7mS for 525 line systems). If the input and output video are not co-timed then the range of delay through the ARC is 3.5 to 4.5 fields.

The delay pulse output from the ARC150 accurately represents the delay through the unit. The pulse is high for a period equal to the delay through the ARC. It can be connected to a Snell and Wilcox audio delay module to automatically set a compensating audio delay.

If the AR150 is put into Bypass mode or, field pairing mode, then the nominal delay remains at four fields. However because the unit acts as a frame synchroniser in these modes, the delay range of the unit is now increased to between 3 and 5 fields.



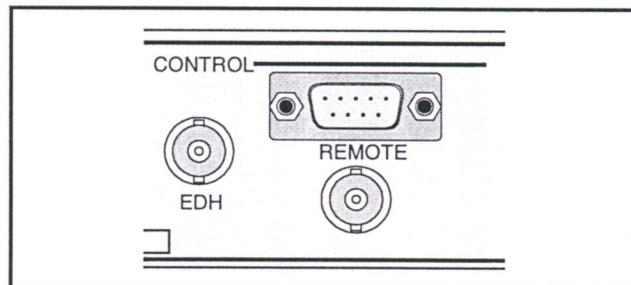
Installation

Remote Control

The unit can be controlled from the special remote panel option via an RS-422-A D-type connector (see Table - *RS-422-A Remote Connections*)

If a remote panel is connected to the RS-422-A port, set the "Front Panel/Remote Comms/Auxiliary switch on the ARCOPI2A card to "FRP & REM" (centre), see Fig. 3.1

The front panel can be disabled by setting the switch to REM (right hand position) see Fig. 3.1



RS-422-A Remote (Master) Connections

Pin	Function	Direction
1	Ground	
2	Transmit –	ARC 150 → Remote
3	Receive +	ARC 150 ← Remote
4	Rec Sig Common	
5	Spare	
6	Trans Sig	
7	Common	ARC 150 → Remote
8	Transmit +	ARC 150 ← Remote
9	Receive –	
	Ground	

The Baud Rate is 38.4Kbs, half duplex. Format is 1 start bit, 7 data bits, 1 parity bit, 1 stop bit.

The serial S&W net is not implemented in current units.

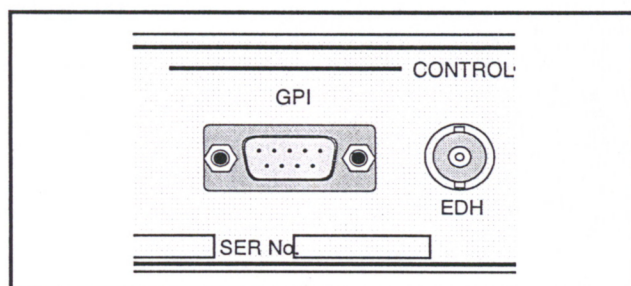
GPI Option

Four of the preset memories can be selected by a contact closure via the GPI (General-Purpose Interface) connector.

Function	Pin	Function	Pin
User memory 1	2	User memory 3	4
User memory 1	6	User memory 3	8
User memory 2	3	User memory 4	5
User memory 2	7	User memory 4	9
Not used	1		

Note that with this option, a small PCB is fitted inside the rear panel.

The GPI interface on the ARC150 has a delay which matches the video processing delay through the ARC. In other words, if a given input video field is desired to produce the first output field built with a new aspect ratio conversion; the GPI contacts which recall that new aspect ratio conversion should be closed during the field when that video field is present at the ARC150 input. Ideally, the contact should be closed a few lines after the vertical sync group of the reference video, and, should remain closed for at least one field period.



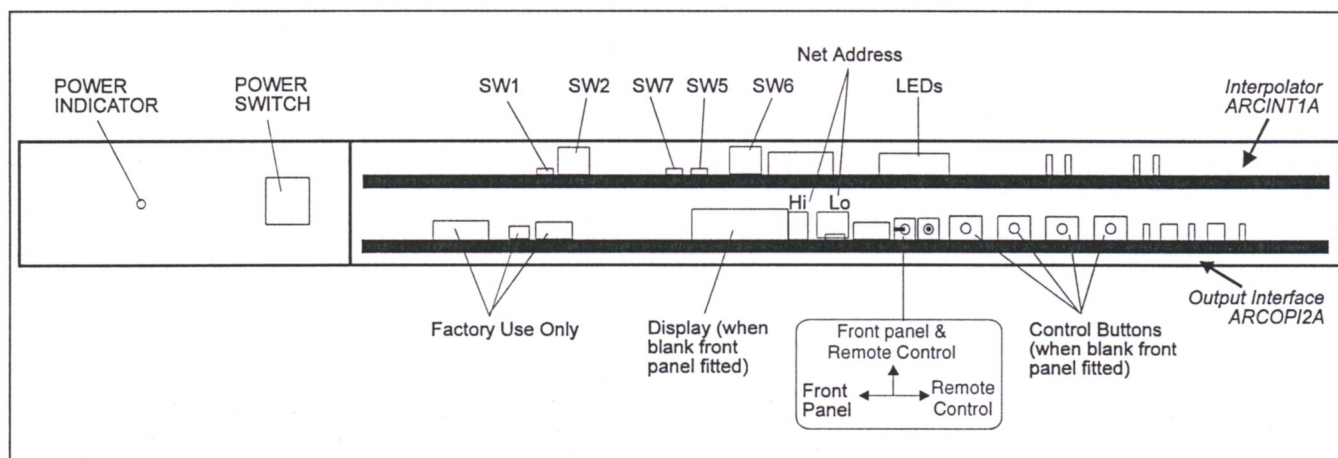
Installation

SWITCHING ON

Check that power is connected to the unit and is switched on. Open the front panel by pushing up the levers at the ends of the panel, and hinging the panel down and sliding partly out.

Set the switch on the Power Unit (see fig. 3.1) to on. Check that the indicator lamp illuminates green and the alpha-numeric display is active.

Fig. 3.1 PCB Locations ARC 150



FAN FAIL WARNING

If when the power is turned ON the power indicator is RED and the card edge alpha-numeric display on the active front panel displays **FAN FAIL** message, the unit should be turned OFF as this indicates a failure of the cooling fan which is located behind the power switch panel.

Operation

INTRODUCTION

There are two versions of the ARC 150, one with a blank panel and switch controls on the front of a PCB, and the other with a full set of front panel controls. Because the use of the controls is so different, two completely separate sets of instructions are provided.

SWITCH CONTROLS (Blank Front Panel)

To gain access to the controls, open the front panel by lifting up the levers at right and left of the panel, hinge the panel down and pull it forward.

To provide a full range of functions with just 4 buttons and an 8-digit display, a menu system is used.

During normal operation, the display slowly cycles through the status of current operation (Home Display). Typically these will be the line standard, the aspect ratio, genlock status and pattern generated if on.

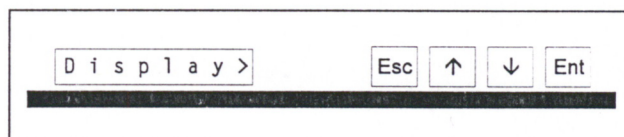
The ENT (Enter) key interrupts the Home Display and allows you to enter the menu structure. It is also used to display a selected option. The ↑ and ↓ keys enable you to scroll up and down through the menu. The ESC (Escape) key returns you to the previous menu level.

A ">" at the right of an option on display indicates that selecting the option (pressing ENT) will lead to another menu level without changing a system setting. If there is not a ">" at the right, pressing ENT will change the indicated system setting.

If the menu being displayed allows you to pick one of a number of options, the currently selected option is indicated by an "*" (asterisk) at the left.

Pressing ↑ and ↓ simultaneously returns a parameter to its preset value.

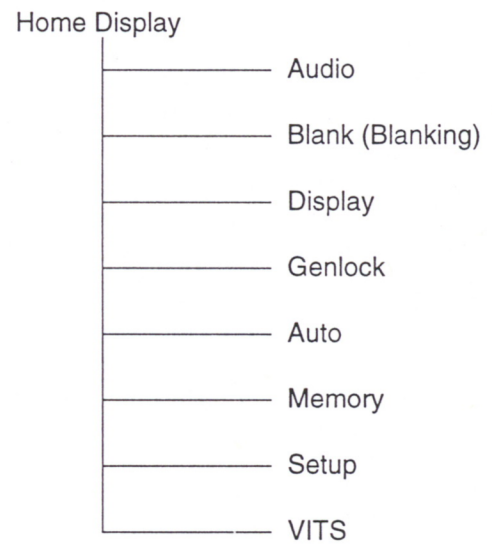
Pressing ENT and ESC simultaneously will return you to the Home Display.



Operation

TOP MENU

Each of the items on the menu is described separately.



Operation

AUDIO

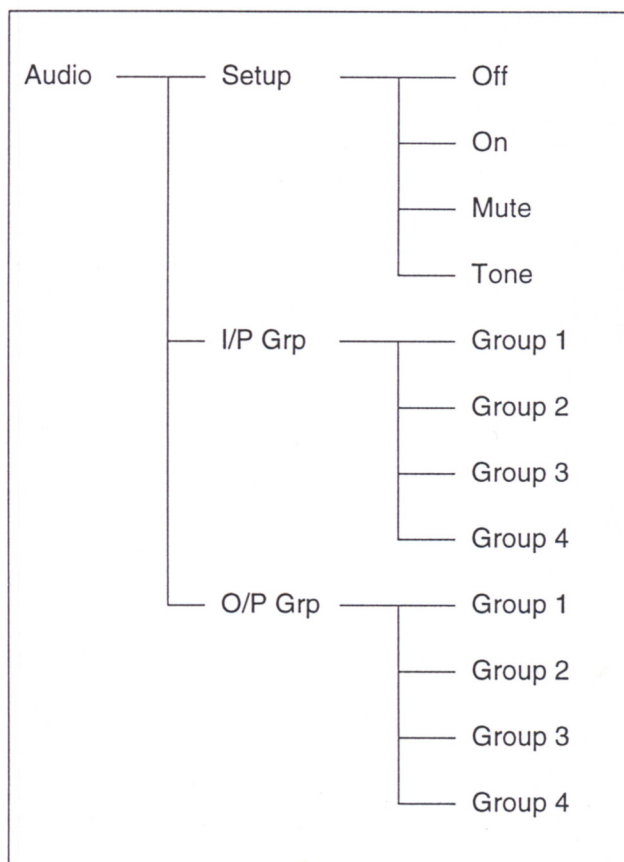
This allows the status of the audio channels to be set up.

Use the I/P Group item to set the input group to 1, 2, 3, or 4.

Use the O/P Group item to select the output group to 1, 2, 3, or 4.

The embedded audio output may be set to Off (no audio data), On (audio data from selected input group), Mute (silence) or Test Tone.

Note that this function will be available only when the Reference is selected to be Input as the input and output clocks must be locked together for operation with embedded audio.



Operation

BLANKING

From the Home Screen, press ENT and scroll to Blank. Press ENT and scroll between Input and Output. Press ENT on the selected function.

Selecting **Input** allows you to adjust the input blanking. Input blanking is used where the source video applied is known to have pixels/lines at the edge of the picture that you do not want to display. The ARC 150 will then blank any output data which has been generated by that input data, regardless of the display control settings.

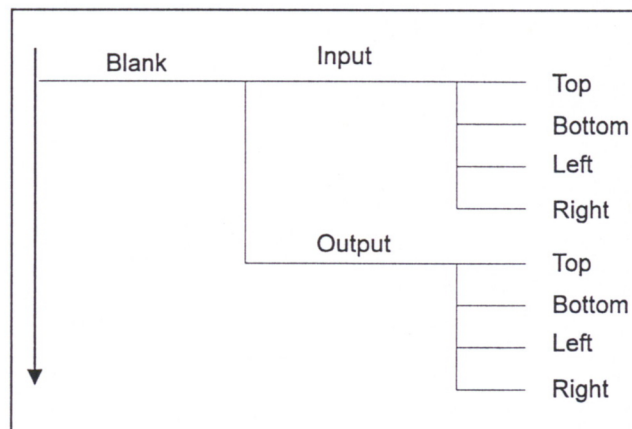
Selecting **Output** is used where you do not want the output to be active on more than a certain range of output lines. For example you can impose an artificial letterbox by bringing the top output blanking down the screen and the bottom output blanking up the screen.

Top: Adjusts the top line of blanking. 0 equals no blanking on any output lines that would normally be visible, 1 equals blank the first active line, etc.

Bottom: Adjusts the bottom line of blanking. 576 (PAL) or 486 (NTSC) equals no blanking on any output lines that would normally be visible. 575 (PAL) or 485 (NTSC) equals blank the last active line, etc.

Left: Adjusts the left-hand edge of blanking. 0 equals no blanking on any output pixels that would normally be visible. 1 equals blank the first active pixel.

Right: Adjusts the right-hand edge of blanking. 720 equals no blanking of any output pixels that would normally be visible. 719 equals blank the last active pixel.



Operation

DISPLAY

From the Home Screen, press ENT and scroll to Display. Press ENT and scroll between Preset and Adjust. Press ENT on the selected function.

Preset allows selection of one of the preset aspect ratio conversions. **Adjust** allows you to create your own aspect ratio conversion.

Auto: Line 23 signalling (PAL only) is used to control the aspect ratio conversion.

4:3>4:3: No aspect ratio conversion.

1.77F>FH: 16:9 anamorphic to full height conversion (left and right-hand edges of input video lost).

1.85L>FH: 1.85:1 letterbox input to full height conversion (left and right-hand edges of input video lost).

1.66L>FH: 15:9 letterbox to full height conversion (left and right-hand edges of input video lost).

1.55L>FH: 14:9 letterbox to full height conversion (left and right-hand edges of input video lost).

1.77F>LB: 16:9 anamorphic to letterbox conversion.

1.85F>LB: 1.85:1 anamorphic to letterbox conversion.

1.66F>LB: 15:9 anamorphic to letterbox conversion.

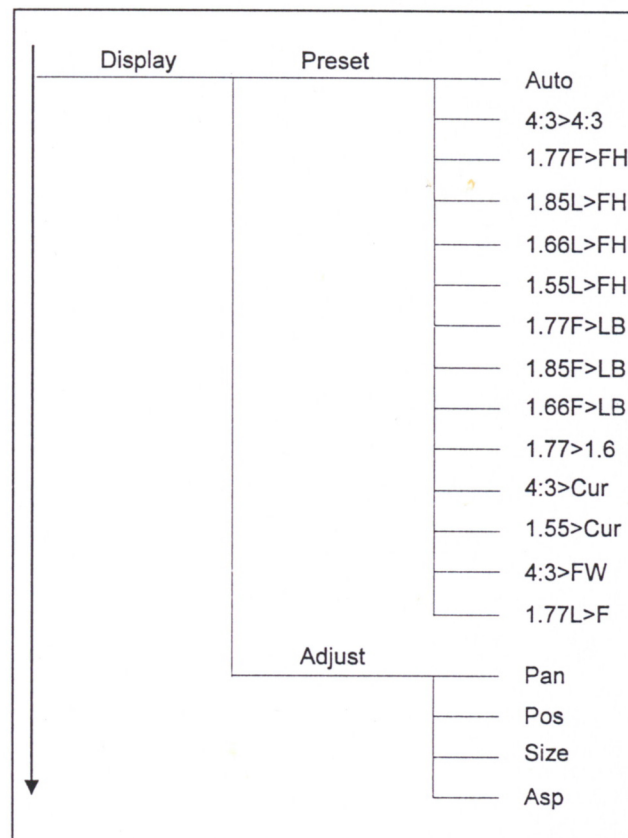
1.77>1.66: 16:9 anamorphic to 14:9 letterbox conversion.

4:3>Cur: 4:3 to 16:9 curtains, i.e. horizontal crush with black bars to left and right of output.

1.55>Cur: 14:9 to curtains, i.e. horizontal crush with black bars to left and right of output.

4:3>FW: 4:3 to 16:9 full width conversion, i.e. top and bottom of picture lost at the output.

1.77L>F: 16:9 letterbox to 16:9 anamorphic conversion.

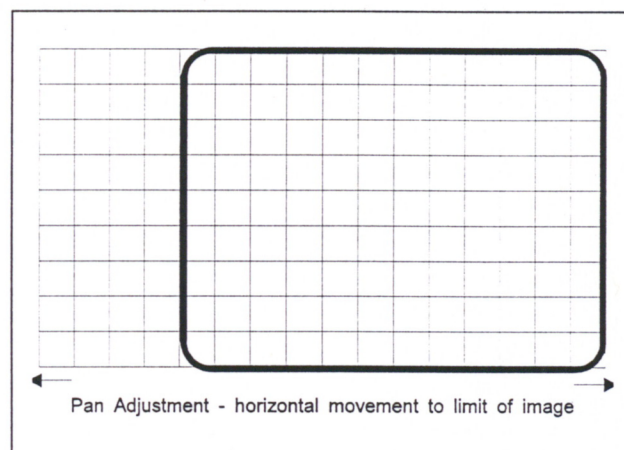


Operation

Pan: adjusts the horizontal position of the output.

Note that this option does not appear if V only processing is selected.

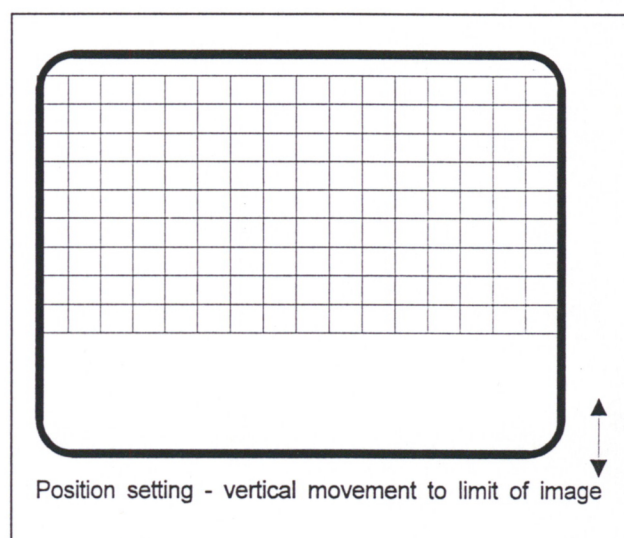
(see set-up menu page 4.11)



Pos: adjusts the vertical position of the output.

Note that this option does not appear if H only processing is selected.

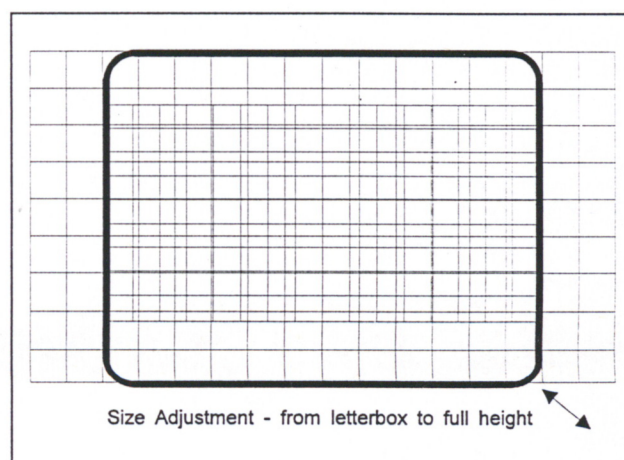
(see set-up menu page 4.11)



Size: Adjusts the horizontal and vertical size simultaneously while maintaining the aspect ratio. The product of SIZ and ASP is limited to the range 0.50 to 2.00, and SIZ is limited to the range 0.50 to 2.00.

Note that this option does not appear if H only processing is selected.

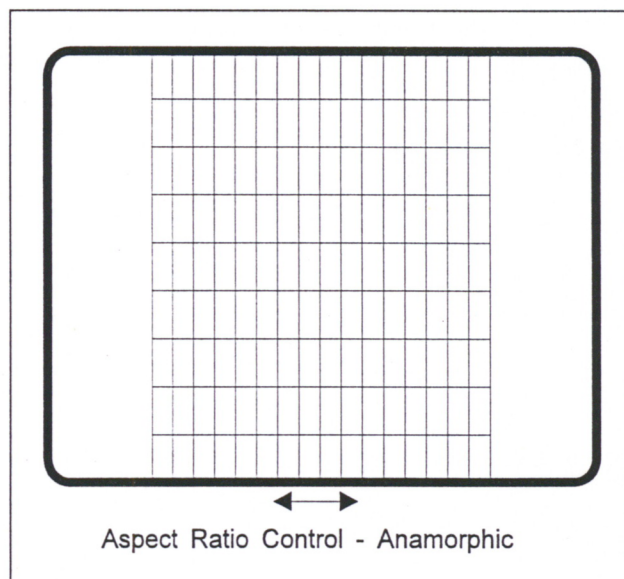
(see set-up menu page 4.11)



Operation

Asp: Adjusts the horizontal size of the output, so changing the aspect ratio. The product of SIZ and ASP is limited to the range 0.50 to 2.00, and ASP is limited to the range 0.25 to 2.00.

*Note that this option does not appear if V only processing is selected.
(see set-up menu page 4.11)*



Operation

GENLOCK

Selects adjustment of the Genlock parameters. From the Home Screen, press ENT and scroll to Genlock. Press ENT and scroll between Source, H Time and V Time. Press ENT on the selected function.

Source selects the source of the genlock reference.

Auto: The ARC 150 will lock to an external analogue reference, if one is present and correct, otherwise it will lock to the input video.

Ext Ref: Forces the ARC 150 to lock to an external reference.

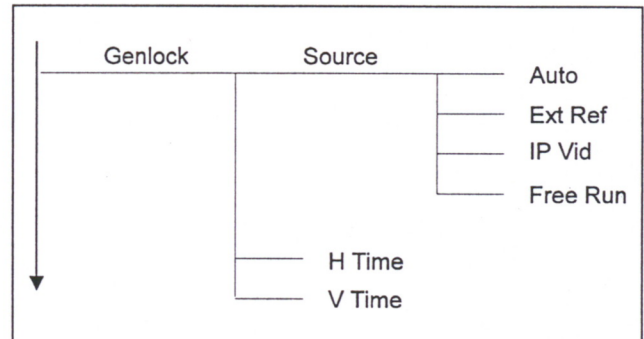
IP Vid: Forces the ARC 150 to lock to the input video.

Free Run: Turns off the Genlock function.

Note that the Audio function will be available only when the Reference is selected to be Input as the input and output clocks must be locked together for embedded audio operation.

H Time allows you to adjust the horizontal Genlock timing with respect to the reference, in pixels.

V Time allows you to adjust the vertical Genlock timing with respect to the reference, in lines.



Operation

AUTO

This allows the user to control the action of the ARC 150 in the presence of an incoming Line 23 aspect ratio signal. From the Home Screen, press ENT and scroll to Line 23. Press ENT and scroll between Auto and IP Blk. Press ENT on the selected function.

Input

This function allows the following selections to be made to the input setup:

Source

This allows the source of automatic aspect ratio control to be selected from the following:

L23 ETSI
L23 ARD
Video Ind

L23 Blk

This sets the blanking action applied to line 23. There are three options.

Auto The machine will either automatically provide the appropriate output signalling blanking using the input signalling

Not Blk The input signalling will not be blanked

.5 Line The first half line of the line 23 signalling will be blanked

VI Type

This selects what type of video index signal is being applied to the ARC input.

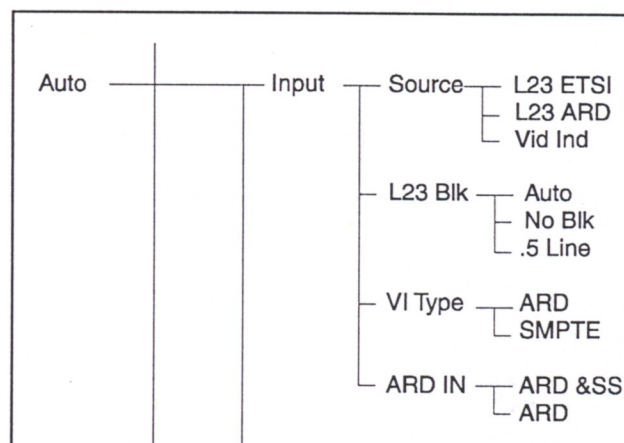
Either ARD Spec or SMPTE (186) may be selected. If SMPTE186 is selected only the bottom 3 bits of the VI data are examined.

ARD IN

This selects the type of ARD information derived from the input.

ARD & SS All ARD and scanning system data

ARD Active region descriptor data only



Operation

Output

This function allows the following selections to be made to the output setup:

Mode

This controls the way the output signalling is selected.

Follow The output line 23 and VI data will be determined automatically by the ARC150 based on either the preset aspect ratio conversion selected, the user memory in use or, the incoming AUTO aspect ratio control signal.

Forced The ARC150 does not use the stored values but uses the values visible on the menus (see below).

Line 23 Set

Type

This sets the type of output-line 23. Selections are either

ETSI

or

ARD

Output On/Off

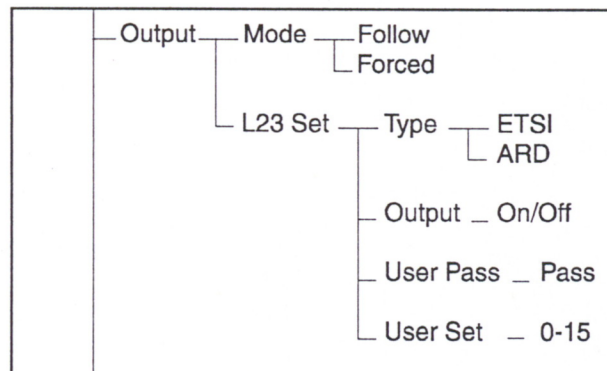
This option has a toggle action. It determines whether or not Line 23 signalling will be present on the output of the ARC 150.

User Pass

If PASS is selected then the user bits are copied from an incoming enhanced line 23 signal to the output if the enhanced line 23 signal has been selected as the source of automatic aspect ratio control.

User Set

This allows the user to set the four enhanced line 23 output user bits to the value shown.



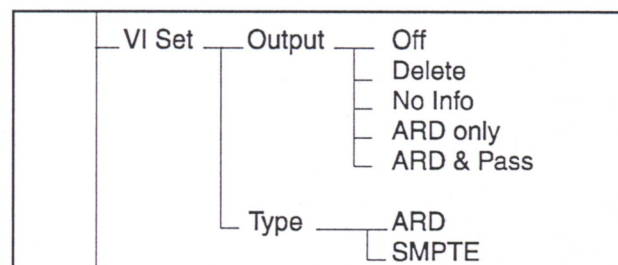
Operation

VI Set

This function sets the state (Output is) and the form of the video index information.

Output

This selects the type of video index information available at the ARC output.



Off No video index output.

Delete Set all VI bits to zero including CRCs.

No Info Set all VI data to zero with valid CRCs.

ARD only Set all fields to zero except Octet 1 the scanning system field which contains the VI data inserted by the ARC150.

ARD & Pass Insert new Octet 1 values but pass all other VI data from the input video.

Note – if you wish to pass VI data from the input of the ARC150 to the output then it is necessary to set the vertical interval lines containing the VI data to be not blanked. Otherwise, the input VI information is lost.

Type

This selects what form of video index output signal is generated. Selections are:

ARD Spec
or
SMPTE 186

Operation

L23 Dat

Aspect

If Auto is selected, the ARC 150 makes its best estimate of the output format and includes that in the Line 23 output.

The other items are the standard line 23 output options and if one is selected, that will be signalled on the output, regardless of the actual video output.

Enhance

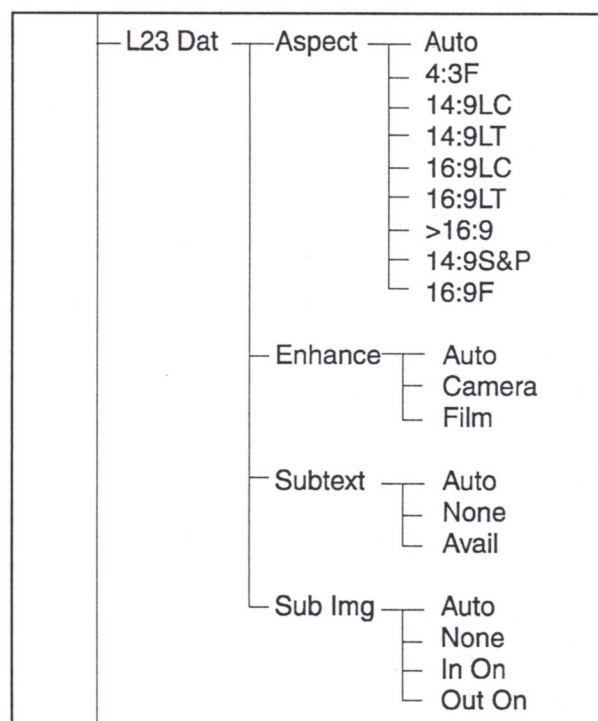
The ARC 150 will automatically provide the output signalling from the input signalling if Auto is selected. Alternatively, Camera or Film can be selected to suit the input material source.

SubText

The ARC 150 will automatically provide the output signalling from the input signalling if Auto is selected. Alternatively, the subtitle teletext signalling may be set to "None" or "Available", as appropriate.

Sub_Img

The ARC 150 will automatically provide the output signalling from the input signalling if Auto is selected. Alternatively, it can be set to "None", Inside Image active or Outside Image active.



Operation

ARD Dat

Scan

This sets the bottom 3 bits of the video index and enhanced line 23 signal to be 4:3 or 16:9 as desired.

Note that this only takes immediate effect if the Mode is set to FORCED.

See Output Setup\Mode above.

ARD

This sets the ARD data of ARD spec video index and enhanced line 23 outputs.

Selections available are:

Coded

4:3

16:9

14:9

ARD=4

4:3 S&P

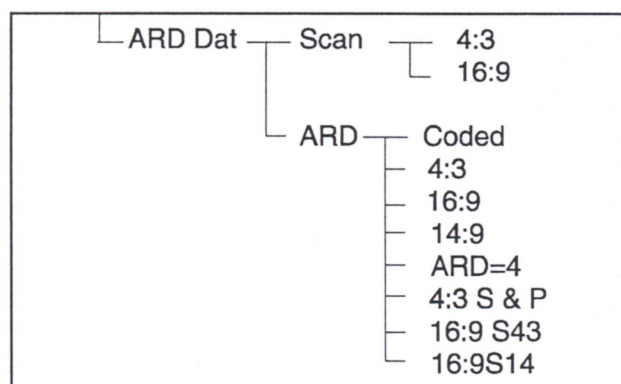
16:9 S4:3

16:9 S14

Note that this only takes immediate effect if the Mode is set to FORCED.

See Output Setup\Mode above.

Note that ARD value 4 is specified as reserved but, it is provided here in case it is allocated a meaning a some future time.



Operation

ETSI PG

Select ETSI PG and select from the list the line 23 signal that you want to activate the selected display.

Select Line 23 4:3F
 Select Line 23 14:9LC
 Select Line 23 14:9LT
 Select Line 23 16:9LC
 Select Line 23 16:9LT
 Select Line 23 >16:9L
 Select Line 23 14:9S&P
 Select Line 23 16:9 F

"LT" refers to Letterbox Top and "LC" refers to Letterbox Centre, "S&P" refers to Shoot and Protect and "F" refers to Full Frame.

When the particular line 23 signal is received, the ARC 150 will recall the display settings, produce the appropriate output aspect ratio and set the line 23 output signal.

ARD PG

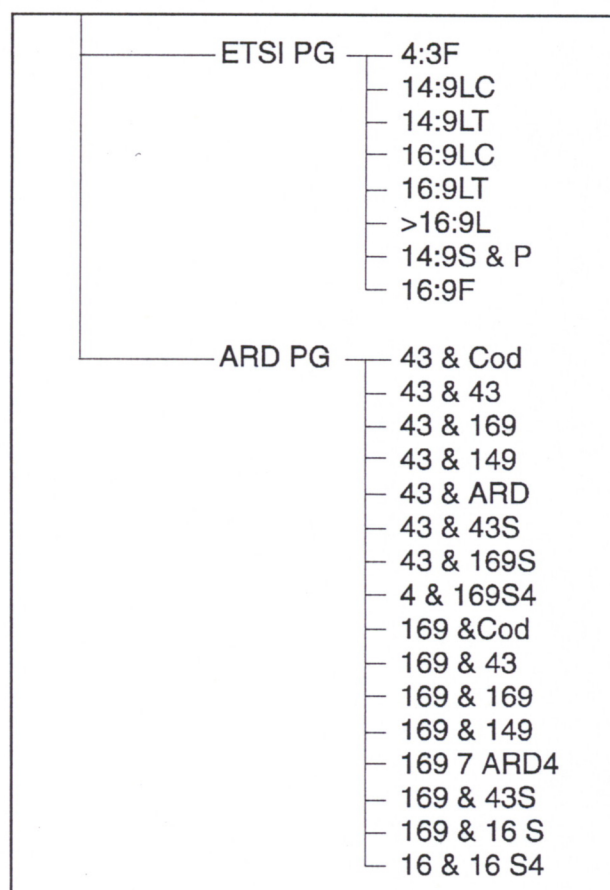
This allows the user to program the ARC150 action in when it receives the stated incoming video index or enhanced line 23 signal.

Selections available are:

4:3 & Cod
 4:3 & 4:3
 4:3 & 16:9
 4:3 & 14:9
 4:3 & ARD
 4:3 & 4:3 S
 4:3 & 16:9 S
 4:3 & 16:9 S4
 16:9 & Cod
 16:9 & 4:3
 16:9 & 16:9
 16:9 & 14:9
 16:9 & ARD4
 16:9 & 4:3 S
 16:9 & 16:9 S
 16:9 & 16:9 S4

Note that if the incoming aspect ratio conversion source is set to L23 ARD or L23 ETSI then it will program the line 23 ARD memories.

If the Auto source is set to video index then it will program the video index memories.



Operation

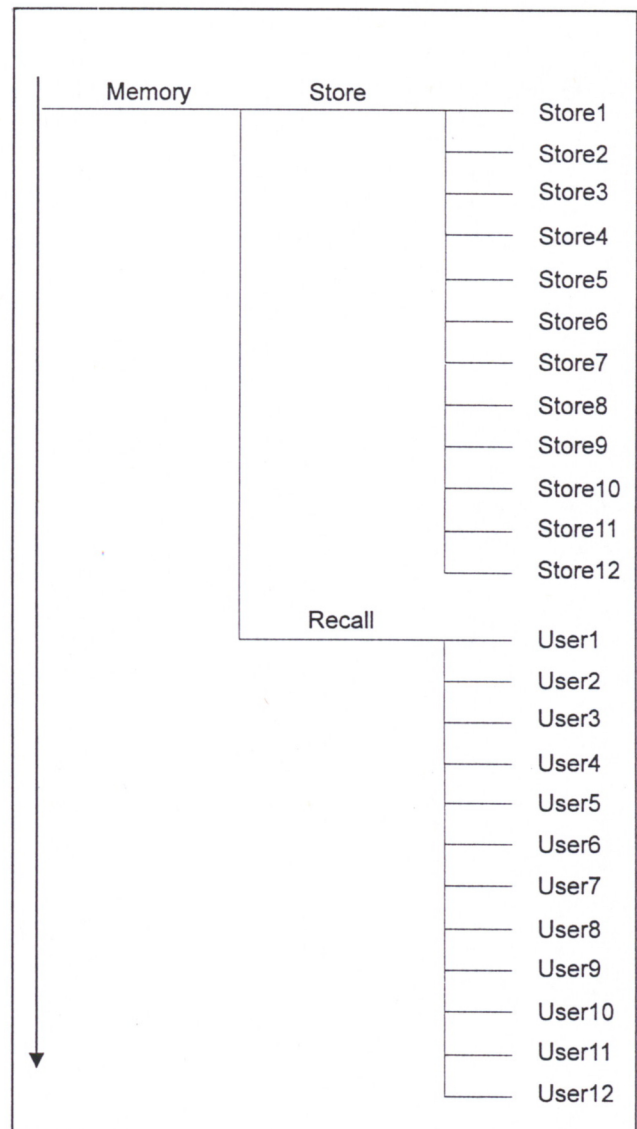
MEMORY

This allows you to store or recall display settings in 12 separate memories. From the Home Screen, press ENT and scroll to Memory. Press ENT and scroll between Store and Recall. Press ENT on the selected function.

Store allows you to select the memory store you wish to retain the current settings in. To store, make sure that the display settings are the way you want them to be, scroll to the store number you are going to use and then press ENT. Keep a careful record of the picture the settings are to be used with.

Recall allows you to recall one of the user memories. To recall, refer to your record of the memory stores, scroll to the required user number and then press ENT; the picture format will immediately change according to the stored parameters.

Note that the state of the Bypass button is also kept in the user memories. If a user memory is stored with Bypass turned ON, whenever that memory is recalled Bypass will be activated. This means that whenever a preset aspect ratio conversion is selected, Bypass is turned OFF. This feature allows users of the GPI to turn on the Bypass mode via the GPI port.



Operation

SETUP

This allows you to select the ARC 150 configuration menu. From the Home Screen, press ENT and scroll to Setup. Press ENT and scroll to select the function you require. Then press ENT again.

Bypass allows you to select whether the video is interpolated or whether it is passed straight through the unit (but with the normal unit delay). Each time you press ENT, the message toggles between NoBypass and Bypass; the default is NoBypass.

Clip allows you to turn the internal clipper on or off. The clipper limits the 10-bit data to 940 for white and 64 for black. Each time you press ENT, the message toggles between Clip Off and Clip On.

Freeze allows you to turn the video freeze function on and off. Each time you press ENT, the message toggles between NoFreeze and Freeze.

Gamut Turns on or off the colour gamut checking system. When On it ensures that the colour values are legal.

GPI allows you to turn on or off the GPI inputs, if the GPI option is fitted. Each time you press ENT, the message toggles between GPI Off and GPI On.

Ip Loss controls the response to the loss of the input video.

Black: the ARC150 output cuts to black when the input is lost

Freeze: the ARC150 output freezes when the input is lost

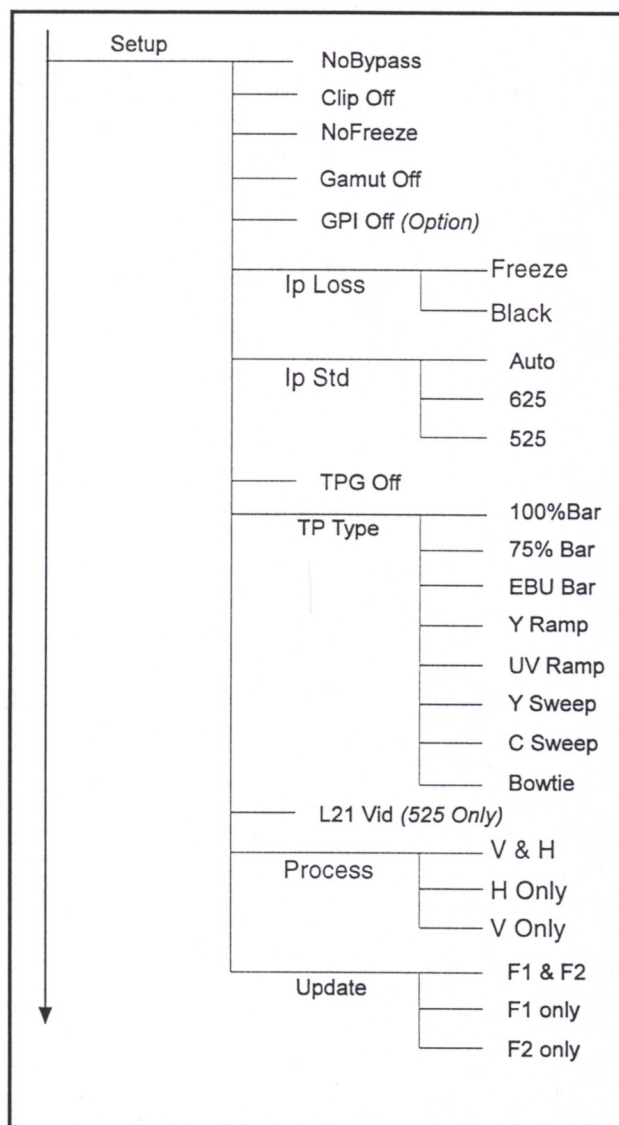
Ip Std allows you to select the incoming video standard.

Auto: automatically detects the incoming video standard.

625: forces the ARC 150 input to the 625/50 standard.

525: forces the ARC 150 input to the 525/59.94 standard

Process: Selects the filtering applied in the ARC150.



Operation

V & H: This is the normal operating mode. Both vertical and horizontal size and position control is available.

H only: Horizontal processing only. Control of only horizontal size and position is available. No vertical or temporal filtering is applied.

V only: Vertical processing only. Control of only vertical size and position is available. No horizontal filtering is applied.

TPG allows you to turn on and off the internal test pattern generator, the pattern being determined by the TP Type selection. Each time you press ENT, the message toggles between TPG Off and TPG On.

TP Type allows you to select the test pattern that will be produced when the internal TPG is switched on. From the Home Screen, press ENT and scroll to Setup. Press ENT and scroll to select TPG Type. Then press ENT again.

Scroll to the pattern type you require and press ENT. The patterns are digitally generated to exact levels; to preserve their integrity there is no adjustment.

Line 21 (525 only) allows you to select whether line 21 is a video line or a VITS line (usually closed captioning). Each time you press ENT the message toggles between L21 Vid and L21 Capt.

Update This allows you to select whether a change in output display parameters is actioned at field or frame rate. This is significant if line 23 signalling is used (this signal is only present once per frame). If the ARC 150 is in the Auto mode and line 23 signalling is set to Auto output, when a change in aspect ratio is signalled at the input, it is preferable that the output video change and the output line signalling occur together. This may not be the case due to internal vertical genlock timing or timing of the external reference. To ensure that the video change and output signalling occur together it is recommended that Update is set to "Field 1" when in the Auto mode.

If "F1 & F2" is selected, the video at the output will change at the first available field boundary after a button has been pressed or a remote control command has been received.

If "F1 only" or "F2 only" is selected the video at the output will only change at the start of the

appropriate output field type after a button has been pressed or a remote control command has been received.

Operation

VITS

This allows you to control the blanking of the vertical interval lines. Note that for 625/50 operation the lines are 7-22 and 320-335, and for 525/59.94 operation the lines are 10-20 (and line 21 if set up to L21 Capt, as above) and 272-282. From the Home Screen, press ENT and scroll to VITS. Press ENT and scroll to select the function you require. Then press ENT again.

If the input and output of the ARC 150 are not locked together, occasional frames will be dropped from the VITS data, as it is not possible to interpolate the data in these lines. It is strongly recommended that if the VITS signal is to be passed through the ARC 150, the unit is operated with the output video frequency locked to the input.

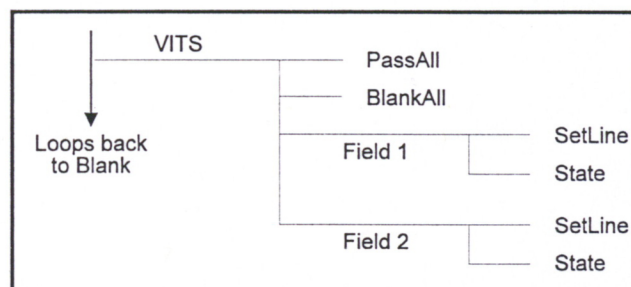
PassAll passes all the VITS lines through the ARC 150 untouched. When selected and ENT is pressed, the message "Done" appears.

BlankAll blanks all the VITS lines. When selected and ENT is pressed, the message "Done" appears.

Field 1 allows you to selectively pass/blank field 1 vertical interval lines. Similarly, **Field 2** allows you to selectively pass/blank field 2 vertical interval lines.

Setline: selects which vertical interval lines of the appropriate field are to be blanked/passed.

State: turns on and off the blanking for the lines set in Setline. Pressing ENT toggles the message between "Pass" and "Blanked".



Operation

OPTION WITH FRONT PANEL CONTROLS

This section describes the action of each of the front panel controls and shows how to operate the ARC 150.

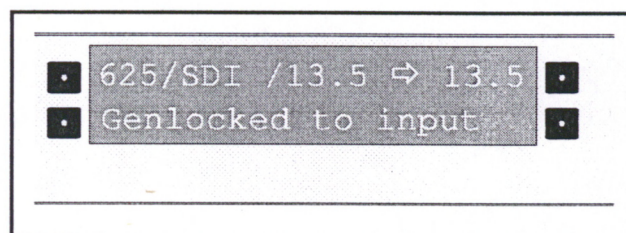
The panel is grouped into areas to simplify operation and the controls in each area will be described in turn.

Pushbuttons

The buttons have indicator lamps in the centre. In general, when a button is pressed the indicator lamp illuminates. If controls are not in the "Preset" position or there is an abnormal condition the indicator lamp flashes. For more information see the appropriate control description.

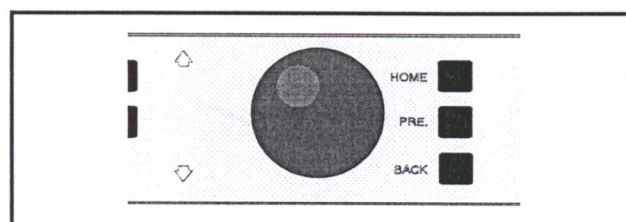
Display and Display Controls

The display comprises two rows of 20 characters; the top row normally shows the current conversion and the bottom row slowly cycles through the current status of the main parameters. A typical top row display is shown, where the input is 625 lines, serial digital with a 13.5 MHz clock rate input and output.



There is a selection pushbutton at both ends of each row. In some cases the row has information on one parameter, in which case the button at either end can be used for selection. In other cases, there are two parameters in the row, in which case the left-hand pushbutton selects the left-hand parameter and the right-hand button the right-hand parameter. An item with further options to select is indicated by ⇌ at the right-hand end of the display and an item with a sub-menu is indicated by □.

The rotary control allows you to scroll menus and to set parameters to a required value. The illuminated arrows indicate the direction options that you have.



To return to the previous menu level, press the "BACK" pushbutton. It may be used to progress back up the menu tree. To return to the status display, press the button labelled "HOME".

To return a value you have just changed to its preset value press "PRE". To return all the values on the display that you have changed, press "HOME" and "PRE" simultaneously.

Operation

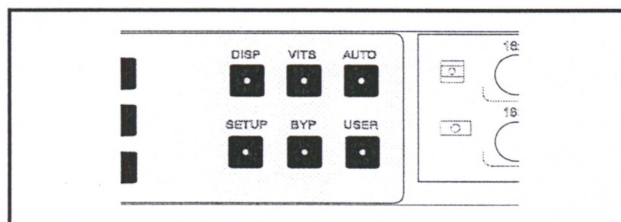
FUNCTION SELECT

These pushbuttons are used to preset operating conditions according to the system requirements. The USER button is provided for Memory Operation

Display

Allows the output picture to be manually selected from the input picture. As an example, if the input picture is in 16x9 format and the output picture selected is 4x3, the output picture can be panned horizontally within the limits of the input picture; if the input picture is 4x3 and the output picture selected is 16x9, the output picture can be "tilted" (positioned) vertically within the limits of the input picture.

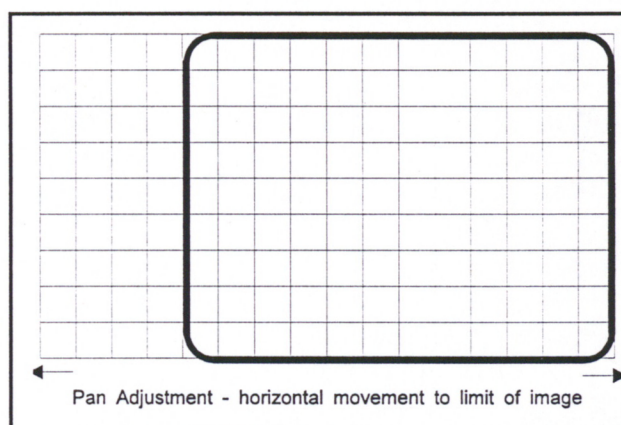
With DISPLAY pressed, the display becomes similar to that shown opposite.



PAN⇌ 0 | | 0⇌POS
ASP⇌1.000 | | 1.000⇌SIZ

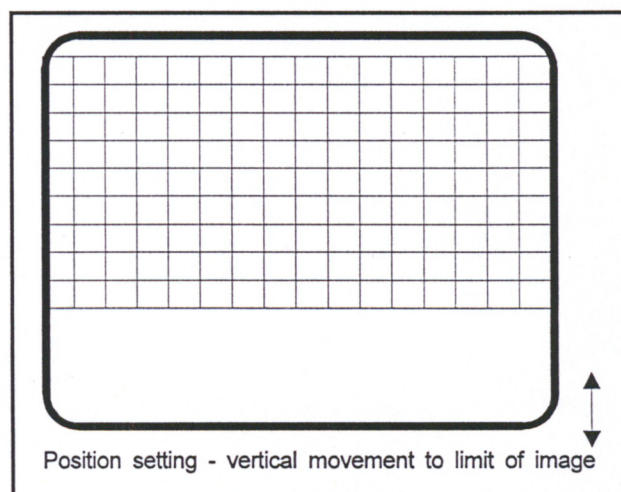
When PAN is selected the image can be moved horizontally. The range is ± 1600 .

Note that this option does not appear if V only processing is selected (see setup menu)



When POS is selected the image can be moved vertically within the display area. The range is ± 3500 .

Note that this option does not appear if H only processing is selected (see setup menu)



Operation

When ASP is selected the image can be slightly distorted (anamorphic display). The product of SIZ and ASP is limited to the range 0.50 to 2.00, and ASP is limited to the range 0.25 to 2.00.

Note that this option does not appear if V only processing is selected (see setup menu)

When SIZ is selected the size of the image can be scaled. The product of SIZ and ASP is limited to the range 0.50 to 2.00, and SIZ is limited to the range 0.50 to 2.00.

Note that this option does not appear if H only processing is selected (see setup menu)

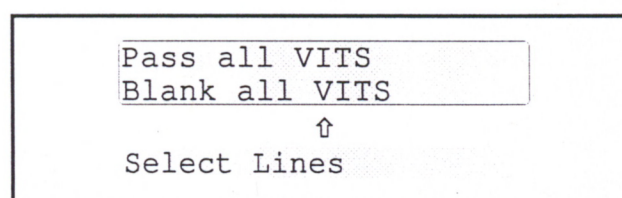
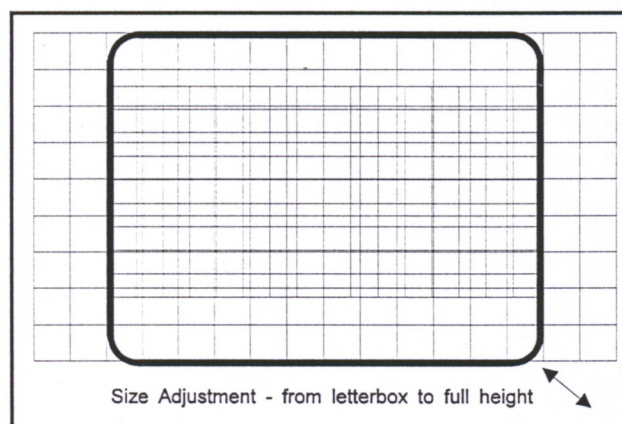
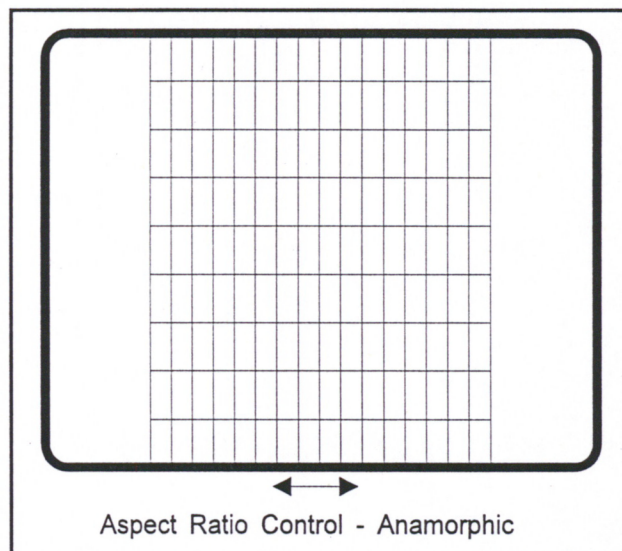
VITS

When the VITS button is pressed, the display becomes similar to that shown opposite:

For the first two, pressing one of the buttons adjacent to the row on the display will cause the appropriate action to take place and a message to be displayed. Scrolling upwards allows the VITS lines to be enabled and then selected.

AUTO

This button is only active if there is a 625 line input with signalling on line 23 or if video index is selected and there is video index signalling present. When AUTO is On, the output aspect ratio is determined by the signalling source on line 23 and the setup selected, see signalling source Line 23 Setup. When an aspect ratio button is pressed, Auto is Off.



Operation

SETUP

When pressed, the display becomes similar to that shown opposite.

Audio Setup

This allows the status of the audio channels to be set up.

Use the I/P Group item to set the input group to 1, 2, 3, or 4.

Use the O/P Group item to select the output group to 1, 2, 3, or 4.

The embedded audio output may be set to Off (no audio data), On (audio data from selected input group), Mute (silence) or Test Tone.

Note that this function will be available only when the Reference is selected to be Input as the input and output clocks must be locked together for embedded audio operation.

Clipper

This allows you to turn the internal clipper on or off. The clipper limits the 10-bit data to 940 for white and 64 for black. Each time you select the function it toggles between On and Off.

Freeze

This allows you to turn the video freeze function on and off. Each time you select the function, it toggles between On and Off.

Gamut Limiter

This turns on or off the colour gamut system each time it is selected. When On it ensures that the colour values are legal.

```

Audio Setup
Clipper      >On
Freeze       >Off
              ↑
Gamut Lim>On
GPI Input>On
GPI Program
Input Std⇌Auto
Panel      ⇌Bright
Pattern    >Off
Patt Type⇌100%Bars
Ref Input⇌Auto
Ref Timing
Update On⇌Field 1&2

```


Operation

GPI Input (when option fitted)

This allows you to turn on or off the GPI inputs, if the GPI option is fitted. Each time you select the function, it toggles between On and Off.

GPI Program

The four GPI inputs initially select User memories 1 to 4. If you wish to recall one of the other memories, e.g. 16:9F to Letterbox on GPI input 2, set the display to "Select Mem for GPI 2" and then press the 16:9F to Letterbox preset button (alternatively you can recall a user memory by pressing USER and then the required memory button). If successful, the message "GPI programmed" will be temporarily displayed.

The GPI interface on the ARC150 has a delay that matches the video processing delay through the ARC. In other words, if a given input video field is desired to produce the first output field built with a new aspect ratio conversion; the GPI contacts which recall that new aspect ratio conversion should be closed during the field when that video field is present at the ARC150 input. Ideally, the contact should be closed a few lines after the vertical sync group of the reference video, and, should remain closed for at least one field period.

Ip Loss controls the response to the loss of the input video.

Black: the ARC150 output cuts to black when the input is lost

Freeze: the ARC150 output freezes when the input is lost

Input Standard

Allows you to set the ARC 150 to the incoming video standard.

When Auto is selected the standard is automatically detected. 525 forces the ARC 150 input to the 525/59.94 standard and 625 forces the ARC 150 to the 625/50 standard.

```
Audio Setup
Clipper      >On
Freeze       >Off
              ↑
Gamut Lim>On
GPI Input>On
GPI Program
Input Std⇒Auto
Panel        ⇒Bright
Pattern      >Off
Patt Type⇒100%Bars
Ref Input⇒Auto
Ref Timing
Update On⇒Field 1&2
```

```
Select Mem for GPI 1
Select Mem for GPI 2
Select Mem for GPI 3
Select Mem for GPI 4
```

```
Input Std⇒Auto
          525
          625
```


Operation

GPI Input (when option fitted)

This allows you to turn on or off the GPI inputs, if the GPI option is fitted. Each time you select the function, it toggles between On and Off.

GPI Program

The four GPI inputs initially select User memories 1 to 4. If you wish to recall one of the other memories, e.g. 16:9F to Letterbox on GPI input 2, set the display to "Select Mem for GPI 2" and then press the 16:9F to Letterbox preset button (alternatively you can recall a user memory by pressing USER and then the required memory button). If successful, the message "GPI programmed" will be temporarily displayed.

The GPI interface on the ARC150 has a delay that matches the video processing delay through the ARC. In other words, if a given input video field is desired to produce the first output field built with a new aspect ratio conversion; the GPI contacts which recall that new aspect ratio conversion should be closed during the field when that video field is present at the ARC150 input. Ideally, the contact should be closed a few lines after the vertical sync group of the reference video, and, should remain closed for at least one field period.

Ip Loss controls the response to the loss of the input video.

Black: the ARC150 output cuts to black when the input is lost

Freeze: the ARC150 output freezes when the input is lost

Input Standard

Allows you to set the ARC 150 to the incoming video standard.

When Auto is selected the standard is automatically detected. 525 forces the ARC 150 input to the 525/59.94 standard and 625 forces the ARC 150 to the 625/50 standard.

```
Audio Setup
Clipper      >On
Freeze       >Off
             ↑
Gamut Lim>On
GPI Input>On
GPI Program
Input Std⇒Auto
Panel        ⇒Bright
Pattern      >Off
Patt Type⇒100%Bars
Ref Input⇒Auto
Ref Timing
Update On⇒Field 1&2
```

```
Select Mem for GPI 1
Select Mem for GPI 2
Select Mem for GPI 3
Select Mem for GPI 4
```

```
Input Std⇒Auto
          525
          625
```


Operation

Pattern

This allows you to turn on and off the internal test pattern generator, the pattern being determined by the Pattern Type setting. Each time you select the function, it toggles between On and Off.

Pattern Type

This allows you to select the test pattern that will be produced when the internal pattern is switched on. The patterns are digitally generated to exact levels; to preserve their integrity there are no adjustments.

Process

Selects the filtering applied in the ARC150.

V & H: This is the normal operating mode. Both vertical and horizontal size and position control is available.

H only: Horizontal processing only. Control of only horizontal size and position is available. No vertical or temporal filtering is applied.

V only: Vertical processing only. Control of only vertical size and position is available. No horizontal filtering is applied.

Reference Input

Selects adjustment of the Genlock input parameters.

Auto: The ARC 150 will lock to an external analogue reference, if one is present and correct, otherwise it will lock to the input video.

Ext Ref: Forces the ARC 150 to lock to an external reference.

IP Vid: Forces the ARC 150 to lock to the input video.

Free Run: Turns off the Genlock function.

Reference Timing

Allows adjustment of the vertical and horizontal timing.

Horizontal allows you to adjust the horizontal Genlock timing with respect to the reference, in pixels.

Vertical allows you to adjust the vertical Genlock timing with respect to the reference, in lines.

Patt Type ⇨ 100% Bars
75% Bars
EBU Bars
Y Ramp
UV Ramp
Y Sweep
UV Sweep
Bowtie

Process ⇨ V&H
Honly
Vonly

Ref Input ⇨ Auto
Ext Ref
Video In
Free Run

Horizontal ⇨ 17 pix
Vertical ⇨ 0 lns

Operation

Line 21 (525 line systems only)

Allows you to select whether line 21 is a video line or a VITS line (usually closed captioning). Each time you select the function it toggles between Video and Caption.

Update On

This allows you to select whether a change in output display parameters is actioned at field or frame rate. This is significant if line 23 signalling is used (this signal is only present once per frame). If the ARC 150 is in the Auto mode and line 23 signalling is set to Auto output, when a change in aspect ratio is signalled at the input, it is preferable that the output video change and the output line signalling occur together. This may not be the case due to internal vertical genlock timing or timing of the external reference. To ensure that the video change and output signalling occur together it is recommended that Update is set to "Field 1" when in the Auto mode.

If "Field 1&2" is selected, the video at the output will change at the first available field boundary after a button has been pressed or a remote control command has been received.

If "Field 1" or "Field 2" is selected the video at the output will only change at the start of the appropriate output field type after a button has been pressed or a remote control command has been received.

Update On⇒Field 1&2
Field 1
Field 2

Operation

BYP

This button allows you to select whether the video is interpolated or whether it is passed straight through the unit (but with normal unit delay). Each time the button is pressed, bypass is toggled between On and Off. Default is to Off.

USER

This button is used to store and recall a set of aspect ratio settings in memory. Each of the aspect ratio buttons gives access to a user memory. For reference purposes, the two rows of 4 pushbuttons are numbered 1 to 4 from left to right on the top row and 5 to 8 on the bottom row. The 2 rows of two pushbuttons are numbered 9 and 10 on the top row and 11 and 12 on the bottom row.

First press USER and then the button associated with the memory you are going to use (if you decide not to proceed, press USER again). When you manually adjust the aspect ratio settings, the indicator in the button of the current aspect ratio flashes. To store the settings in memory, simultaneously press the appropriate aspect ratio and HOME buttons; a message similar to that shown opposite will appear.

Keep a record of the picture type and memory in which the settings are stored. To recall the settings if you are not in the User mode, just press USER (the button indicator will flash) and the button associated with the memory number required. If you are in the User mode (button indicator illuminated) press the memory button only.

See Appendix for a list of the parameters stored in the memories.

Store user memory: 4

Operation

Blanking Setup

To set up blanking, press the HOME and DISP buttons simultaneously. You can select either Input Blanking or Output Blanking.

Input blanking is used where the source video applied is known to have pixels/lines at the edge of the picture which you do not want to display. The ARC 150 will then blank any output data which has been generated by the input data, regardless of the display control settings.

```
Input Blanking  [F]
Output Blanking [F]
```

```
TOP  ⇨  0 || 576 ⇨ BOT.
LEFT ⇨  0 || 720 ⇨ RIGHT
```

Output blanking is used where you do not want the output to be active on more than a certain range of output lines. For example you can impose an artificial letterbox by bringing the top output blanking down the screen and the bottom output blanking up the screen

Top: Adjusts the top line of blanking. 0 equals no blanking on any output lines that would normally be visible, 1 equals blank the first active line, etc.

```
TOP  ⇨  0 || 576 ⇨ BOT.
LEFT ⇨  0 || 720 ⇨ RIGHT
```

Bottom: Adjusts the bottom line of blanking. 576 (PAL) or 486 (NTSC) equals no blanking on any output lines that would normally be visible. 575 (PAL) or 485 (NTSC) equals blank the last active line, etc.

Left: Adjusts the left-hand edge of blanking. 0 equals no blanking on any output pixels that would normally be visible. 1 equals blank the first active pixel.

Right: Adjusts the right-hand edge of blanking. 720 equals no blanking of any output pixels that would normally be visible. 719 equals blank the last active pixel.

Operation

Video Index and enhanced Line 23 Setup

Control and setup of all video index and line 23 operations is obtained by pressing the Home and Auto buttons together.

Note that menu items will only appear if the correct hardware is installed and, the unit is configured correctly. For example, video index items will not appear if video index is not fitted. Also, for 525 line inputs, the line 23 menu items will not appear. See Appendix for further information.

Input Setup

This function allows the following selections to be made to the input setup:

Source

This allows the source of automatic aspect ratio control to be selected from the following:

L23 ETSI
L23 ARD
Video Ind

L23 Blank

This sets the blanking action applied to line 23. There are three options.

Auto The machine will either automatically provide the appropriate output signalling blanking using the input signalling

Not Blank The input signalling will not be blanked

½ Line The first half line of the line 23 signalling will be blanked

VI Type

This selects what type of video index signal is being applied to the ARC input.

Either ARD Spec or SMPTE 186 may be selected. If SMPTE186 is selected only the bottom 3 bits of the VI data are examined.

ARD Input

This selects the type of ARD information derived from the input.

ARD & Scan All ARD and scanning system data

ARD Only Active region descriptor data only

Input Setup

Output Setup

ETSI L23 Program

VI/L23 ARD Program (L23ARD only)

Output Setup

This function allows the following selections to be made to the output setup:

Mode

This controls the way the output signalling is selected.

Follow The output line 23 and VI data will be determined automatically by the ARC150 based on either the preset aspect ratio conversion selected, the user memory in use or, the incoming AUTO aspect ratio control signal.

Forced The ARC150 does not use the stored values but uses the values visible on the menus (see below).

Line 23 Setup

Type

This sets the type of output-line 23. Selections are either

ETSI
or
ARD

Line 23 Out (On/Off)

This option has a toggle action. It determines whether or not Line 23 signalling will be present on the output of the ARC 150.

User Bits

This allows the user to set the four enhanced line 23 output user bits to the value shown. If PASS is selected then the user bits are copied from an incoming enhanced line 23 signal to the output if the enhanced line 23 signal has been selected as the source of automatic aspect ratio control.

Note that on the RollCall interface and card edge interface then PASS is obtained by setting the User bits to the value 16.

Operation

Video Index Setup

This function sets the state (Output is) and the form of the video index information.

Output is

This selects the type of video index information available at the ARC output.

Off	No video index output.
Delete	Set all VI bits to zero including CRCs.
No Info	Set all VI data to zero with valid CRCs.
AR only	Set all fields to zero except Octet 1 the scanning system field which contains the VI data inserted by the ARC150.
AR & Pass	Insert new Octet 1 values but pass all other VI data from the input video.
AR No Pan	Insert new Octet 1 data, set all pan/scan data to zero but copy all other VI data from the input.

Note – if you wish to pass VI data from the input of the ARC150 to the output then it is necessary to set the vertical interval lines containing the VI data to be not blanked. Otherwise, the input VI information is lost.

Type

This selects what form of video index output signal is generated. Selections are:

ARD Spec
or
SMPTE 186

Line 23 ETSI Data

This allows the aspect ratio, type of enhancement, Sub Text and Sub-Image data to be set. This data will activate the selected display.

Asp Ratio selections available are:

4:3FF
14:9 Cen
16:9 Cen
16:9 Top
>16:9 Cen
S&P 14:9
16:9 FF

“S&P” refers to Shoot and Protect and “FF” refers to Full Frame.

When the particular line 23 signal is received, the ARC 150 will recall the display settings, produce the appropriate output aspect ratio and set the line 23 output signal.

Enhanced Options:

Auto The machine will automatically provide the appropriate signalling, using the input signalling.

Camera or
Film

Can be set depending on the input material source.

Sub-Text Options:

Auto The machine will automatically provide the appropriate output signalling, using the input signalling.

Not Avail Subtitle teletext not available

Available Subtitle teletext available

Sub-Image Options:

Auto The machine will automatically provide the appropriate output signalling, using the input signalling.

Alternatively it can be set to
None, Inside Image active or
Outside Image active.

Operation

VI & L23 (ARD) Data

Scan Sys

This sets the bottom 3 bits of the video index and enhanced line 23 signal to be 4:3 or 16:9 as desired.

Note that this only takes immediate effect if the Mode is set to FORCED.

See Output Setup\Mode above.

ARD Value

This sets the ARD data of ARD spec video index and enhanced line 23 outputs.

Selections available are:

Code Frame

4:3

16:9

14:9

ARD=4

4:3 SP

16:9 SP149

16:9 SP4:3

Note that this only takes immediate effect if the Mode is set to FORCED.

See Output Setup\Mode above.

Note that ARD value 4 is specified as reserved but, it is provided here in case it is allocated a meaning a some future time.

ETSI L23 Program

Prior to entering "ETSI L23 Program", select one of the preset displays or create one of your own by pressing the DISP button. Then select ETSI L23 Program and select from the list the line 23 signal that you want to activate the selected display.

Select Line 23 4:3FF

Select Line 23 14:9LC

Select Line 23 14:9LT

Select Line 23 16:9LC

Select Line 23 16:9LT

Select Line 23 >16:9L

Select Line 23 14:9S&P

Select Line 23 16:9 FF

"LT" refers to Letterbox Top and "LC" refers to Letterbox Centre, "S&P" refers to Shoot and Protect and "FF" refers to Full Frame.

When the particular line 23 signal is received, the ARC 150 will recall the display settings, produce the appropriate output aspect ratio and set the line 23 output signal.

VI/L23 ARD Program (L23 ARD Only)

This allows the user to program the ARC150 action in when it receives the stated incoming video index or enhanced line 23 signal.

Selections available are:

4:3 & Coded Frame

4:3 & 4:3

4:3 & 16:9

4:3 & 14:9

4:3 & ARD = 4

4:3 & 4:3 S&P 14:9

4:3 & 16:9 S&P 14:9

4:3 & 16:9 S&P 4:3

16:9 & Coded Frame

16:9 & 4:3

16:9 & 16:9

16:9 & 14:9

16:9 & ARD = 4

16:9 & 4:3 S&P 14:9

16:9 & 16:9 S&P 14:9

16:9 & 16:9 S&P 4:3

Note that if the incoming aspect ratio conversion source is set to L23 ARD or L23 ETSI then it will program the line 23 ARD memories.

If the Auto source is set to video index then it will program the video index memories.

Operation

APPENDIX – Video Index and Enhanced Line 23

Version A8 of the ARC150 software introduced a number of new features.

The ARC gains the ability to read incoming video index signals and to output it's own video index. Video index is a signal embedded in the D1 output stream that can be used to convey aspect ratio information. The basic version of video index is described in SMPTE document RP186. An enhanced version of video index incorporating more aspect ratio information has been introduced in the United Kingdom for control of MPEG encoders. The ARC150 supports both forms of video index and, they are referred to as SMPTE186 and ARD Spec' version throughout. (ARD is active region descriptor). The serial data format of the video index is described in SMPTE document SMPTE125M-1995.

In the United Kingdom, a modified version of line 23 signalling which allows the embedding of the same information as that in ARD spec Video Index signals has been defined. The ARC150 supports this ARD spec version of line 23 at both it's input and output. The new line 23 will be referred to as L23 ARD and the previous version of line 23 as L23 ETSI throughout.

BACKGROUND INFORMATION ON VIDEO INDEX

The original SMPTE RP186 video index scheme includes in the very first data byte (Class 1.1 data Octet 1) a scanning system field. This can signal either 4:3 or 16:9 using the bottom 3 bits of the data byte as shown below.

Octet Value	Meaning	B2	B1	B0
0	no information	0	0	0
1	525/59.94 4:3	0	0	1
2	625/50 4:3	0	1	0
3	Reserved	0	1	1
4	Reserved	1	0	0
5	525/59.94 16:9	1	0	1
6	625/50 16:9	1	1	0
7-255	Reserved	1	1	1

Within Europe an extension to this data byte has been defined and is known as the ARDSPEC version. ARD being Active Region Descriptor. This retains the meaning of the bottom 3 bits of the data byte as 4:3 or 16:9 but in addition, it defines the meanings of the next 3 bits as follows.

Active format	Intended aspect ratio of active region	B5	B4	B3
0	Active region is same as coded frame	0	0	0
1	4:3	0	0	1
2	16:9	0	1	0
3	14:9	0	1	1
4	Reserved for future use	1	0	0
5	4:3 with shoot-and-protect 14:9 centre	1	0	1
6	16:9 with shoot-and-protect 14:9 centre	1	1	0
7	16:9 with shoot-and-protect 4:3 centre	1	1	1

The enhanced version of Line 23 (L23 ARD) basically embeds the same information in the line 23 data. i.e. the Scanning system and ARD fields. In addition, it provides four User bits.

Operation

The ARC150 can read incoming aspect ratio signalling and output it. This means that the aspect ratio conversion it performs can be automatically controlled by the incoming video signalling. It is possible to program the action that the ARC takes for each of the incoming signalling values. The parameters that are stored when the signalling is programmed are as follows:

1. Output picture Size.
2. Output picture Aspect ratio.
3. Output picture Horizontal position.
4. Output picture Vertical position.
5. Output line 23 signal.
6. Output video index signal.
7. Bypass Mode setting.

These parameters are also stored for the User Display Memories and are recalled when a User Memory is selected.

Both line 23 and video index outputs can be turned on simultaneously. Note that if the line 23 output mode is set to ARD then the line 23 output data will be the same as that being output on the video index signal. It is however possible to program the Line 23 ARD and Video Index inputs independently.

The video index information is inserted on line 11 and 324 for 625 line systems and lines 14 and 277 for 525 line systems.

System Overview

The ARC 150 is a digital-in digital-out Aspect ratio Converter.

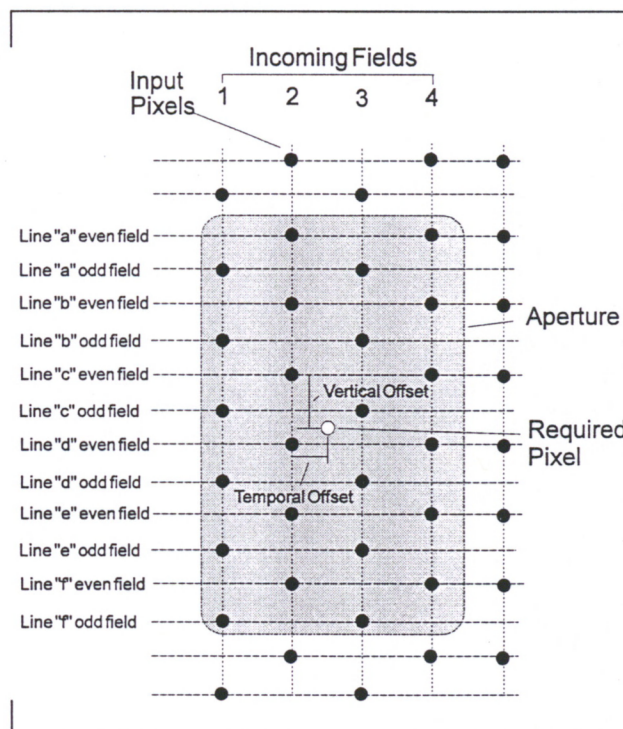
To change the aspect ratio, the picture has to be stretched or compressed in either or both the horizontal and vertical plane. To stretch or compress the picture, data has to be interpolated from adjacent pixels.

The ARC 150 vertical temporal interpolation operates on four fields and six lines of the incoming video and is effectively a 24-point filter (optimised individually for every pixel point of the picture). Filtering is carried out separately for luminance and chrominance. A large horizontal filter is applied after the vertical filter.

There are two factors influencing the performance of the interpolation, one is the number of points being used in the filter, and the other is the need to carry out vertical-temporal interpolation. To explain the latter factor, six lines on one field would only access half the information in the interlace system but when we use 12 lines from a full frame, the information in the second field is displaced in time from the first field; this must be taken into account when interpolating.

In the diagram you are looking at the lines of the video structure end-on as if you are looking into the side of the CRT face while the pixels of four fields are displayed. The field offset of the required pixel from field 2 is the temporal offset and the line offset from the nearest line in field 2 is the vertical offset. The area shaded is the aperture which is centred on the required pixel position. A proportion of every pixel in the aperture is used in creating the new pixel; the proportions diminish as the distance from the required pixel increases.

In addition to changing the picture aspect ratio, the unit can read and act on line 23 signalling on the input signal and can insert line 23 signalling on the output.



System Overview

BLOCK DIAGRAM DESCRIPTION

Referring to the block diagram (drawing ARC150), the OPI card decodes the D1 serial digital video into separate luminance and chrominance data streams and feeds them to FIFO buffers, which allow for different input and output clock rates.

The data is then fed to the INT (Interpolator) card where all the required vertical/temporal and horizontal interpolation is carried out.

From the INT card the data is fed back to the OPI card where it is applied to a gamut limiting circuit. When gamut limiting is selected, any digital values that would provide illegal video values are brought within bounds.

From the gamut system, the data is output blanked and converted back to serial digital (656) format before being fed out of the unit.

Data from line 23 (625 line systems) is decoded and, when Auto is selected, provides automatic selection of the aspect ratio via the control circuits.

If the GPI interface option is fitted, an input on one of the four lines can be used to select a memorised output format and automatically set the output aspect ratio.

The syncs and timing are obtained either from a reference input (genlock) or from the video input, via a phase-locked-loop.

An internal pattern generator can be connected to the output in place of the interpolated signal.

The control circuit on the OPI card accepts inputs from the front panel, the card edge switches, or a remote panel (as well as the GPI and line 23 inputs) and provides the necessary control signals to the rest of the ARC 150. It also provides an output which is equal to the delay through the unit, and an EDH (fault) output.

Technical Description

INTRODUCTION

This section gives a card-by-card description of the ARC-150 unit. Circuit diagrams are in section 7.

Technical Description

INTERPOLATOR CARD (ARCINT1A)

This card is a complete vertical, temporal and horizontal interpolator. The vertical/temporal aperture is six lines by four fields. It has support for VITS bypassing.

Top Level Drawing

This shows all the major circuit blocks of the card and their interconnections. Signals enter the board from the edge connectors at the left-hand side of the diagram and exit at the right-hand side.

Field Store Control (INT1A_01)

This shows the two programmable devices which provide all the control signals for the field store chips on the board. Input field store write control and output field store read control is performed by N115 (DISTRACK). N115 also contains a test signal generator. The input store read control and output store write control is performed by N138 (OVERACT). N138 also provides controls for the line store pipelines and the field store switching system.

Data Input (INT1Y_02)

Video data enters the board via N78 and N89 and is passed to the input field stores. Normally, data comes in as offset binary and is passed through N62 to become 2s complement in the field stores. If switch SW4 (drawing INT1A_27) is closed, the incoming data is replaced by a test pattern generated in N115 (drawing INT1A_01). The test pattern is selected using hex switch SW2 (drawing INT1A_27).

Data is written to each of the six field stores in turn as successive input fields reach the board. The output of the store is routed via the field store switch to the vertical temporal filter.

Field Store 1 to 6 (INT1A_03 to INT1A_08)

Each of these drawings contains three ICs that make up each of the input field stores. Data is written in at the input field rate and read out at the output field rate. On any given input field only one of the input stores is written. On each output field, all input stores are read.

Field Store Switching (INT1QA_09)

This takes in the data output from the six input stores and selects four of the six for use by the vertical temporal filter. The switching is controlled by the bus S[7:0] from N138 (drawing INT1A_01). The top 8 bits of video data are switched using D-type latches. The bottom two bits are routed via PALs N108 and N126.

Line Stores 1 to 5 (INT1A_10 to INT1A_14)

Each of these drawings shows six line stores with their inputs connected together. The line stores have individual write resets but common read resets. The outputs of each of the line stores are fed to different multiply/adders (2246 devices, drawing INT1A_16) for filtering. Note that the stores on diagram INT1A_14 contain the two least significant bits from all four of the field store switch outputs.

Coefficient Control (INT1A_15)

N112 (Actel Compact) reads the vertical temporal coefficients out of EPROMs N82 and N83. The EPROM outputs are latched in N130 (Actel Latchact) and then fed to the multiply/adders (2246 devices, drawing INT1A_16) which do the filtering. N112 also generates the control signals for the 2246 devices.

Interpolation Arithmetic (INT1A_16)

This drawing shows the six multiply/adders (2246 devices N33, N55, N71, N98, N117, N139) which do the vertical temporal filtering. Each 2246 receives data from the line store pipelines and the coefficient latch N130 (drawing INT1A_15) and multiplies and sums them. The 2246 device outputs are latched by D-types N34 and N49.

Output Field Stores 1 & 2 (INT1A_17, INT1A_18)

Each of these drawings shows a complete YUV field store. The stores are written with the output of the vertical temporal filter. The store output is sent to the clipping and blanking circuitry. Output field store 1 is written during output field two and read during output field one. Output field store 2 is written during output field one and read during output field two.

Output Clip (INT1A_19)

N45 (Actel Clipact) takes in the data from the output field stores, clips it to ten bits and applies horizontal blanking. The field store output data is sent to the circuit shown on drawing INT1A_20.

Horizontal Rate Converter (INT1A_20)

This is the top level drawing of the rate converter (RCV) circuits. Data enters via D-types N23 and N35 and is passed to circuits on one of the drawings INT1A_22, INT1A_23 or INT1A_24. From these circuits the output is taken to the backplane via D-types N43, N57 and N63. If the RCV is not active, these devices are tri-stated. Drawing INT1A_21 also shown here controls the RCV.

Technical Description

RCV Coefficient Control (INT1A_21)

This drawing shows the control system for the rate converter. Actel N13 generates all the control signals. Controls which have critical timing are passed through D-types N10, N14 and N18. This drawing also shows the EPROM N1 which holds the RCV interpolation coefficients. These are loaded into the filter at the start of each field. N1 also contains the control register values for the filter chips which are also loaded at field rate.

Notice that if the RCV is fitted, the three output field store controls OPR7 (ORLRS) OPR6 (OCCGR) and OPR3 (OYCGR) are also taken from N13. The corresponding outputs from N115 (drawing INT1A_01) are tri-stated in this case. Also, if the RCV is fitted, the blanking applied by N45 (drawing INT1A_19)) is controlled by the two control lines YBLACK and CBLACK from N13.

RCV Luma Interpolator (INT1A_22)

The luminance is passed through the FIR filter N15 into line stores N2 and N3. It then goes through the 2:1 decimating filter N11. It is clipped and has the ms bit inverted in the PAL N20 before being sent to the backplane via N43 and N57 (drawing INT1A_20). If the input and output clock frequencies to the RCV are different, the handover from one clock to the other is done in the line stores N2 and N3.

RCV Chroma Interpolator (INT1A_23)

The multiplexed chrominance data is passed through the FIR filter N16 and then into the line stores N4 and N5. It is separated into separate U and V streams before entering a pair of 2:1 decimating filters (N6 and N7). The data is re-multiplexed and passed through the clipper PAL N17 before being sent to the backplane via N63 and N57 (drawing INT1A_20). If the input and output clock frequencies to the RCV are different, the handover from one clock to the other is done in the line stores N4 and N5.

RCV Bypass Delay (INT1A_24)

VITS lines do not pass through the filters as it is not possible to provide a transparent path. Instead, three bypass line stores are provided (N30, N42 and N52). Their outputs are only enabled when reading VITS lines and are tri-stated otherwise. Because the VITS data does not pass through the Clipper PALs it is necessary to invert the ms bit of the VITS in N45 (drawing INT1A_19) during the VITS interval. There is a control line MSB_INVERT from N13 (drawing INT1A_21) to N45 which controls the ms bit inversion when the RCV is active.

If the input and output clock frequencies to the RCV are different, the handover from one clock to the other is done in the line stores N30, N42 and N52.

F & H Inputs (INT1A_25)

This is where the incoming vertical (F_IN and F_OUT) and horizontal (H_IN and H_OUT) sync signals are clocked onto the board using D-types N96 and N97.

Clock Buffering (INT1A_26)

All clock buffering is performed by the circuits shown on this drawing. Incoming balanced ECL clocks are received from the backplane by N31 and converted to TTL by N56. These clocks are then fed to PAL N77 for routing to the clock distribution networks.

The selection of clocks and their frequencies is controlled by the control bus CKSEL[6:0] which comes from the CPU interface Actel N12 (drawing INT1A_27). There are three clock distribution networks, input clock, output clock and processing clock. These networks may operate at different clock frequencies if any sample rate changing is being done. The input to each of the networks is taken from N77 into the input of an integrated phase locked loop (PLL) IC (N69, N76, N88). The PLL generates one clock at the same frequency as the input and one at double the input frequency. The PLL outputs are buffered and delayed to provide the various clock waveforms that are required.

Microprocessor (INT1A_27)

This drawing shows the microprocessor which controls the whole board. N44 is the processor, which has a static RAM (N8) and a flash EPROM (N147) associated with it. The processor also provides, via N25, the 8 bit multiplexed CPU bus which is fed to all the FPGAs. This drawing also shows the Actel N12 which handles the message passing between the interpolator CPU and the master control CPU and passes some switch settings and the slot number to the interpolator CPU. A serial link is provided by N54 for downloading software and printing debug information.

Power In and Decoupling (INT1A_28)

This drawing shows the backplane power supply connections and the reset circuitry (SW1, N21 and N22).

Technical Description

+5V Decoupling (INT1A_29)

This drawing shows all the +5V power supply decoupling capacitors.

-5V Decoupling (INT1A_30)

This drawing shows all the -5V power supply decoupling capacitors.

PCB Mechanics (INT1A_31)

This drawing shows all the non-electrical parts that are included in the PCB construction.

Technical Description

OUTPUT INTERFACE CARD (ARCOPI2A)

In this application the card provides an input interface, a feed to the Interpolator card, and the output interface for the signals from the Interpolator card. It also contains the user controls microprocessor

Serial Input (ARCOPI2A Sheet 1)

The circuits Q15, N93 (equalising), N95 (PLL) and N96 (10-bit serial to parallel converter). N119 provides a serial output for active loop-through operation.

The parallel data is fed to two FIFOs (N141, N142), which are used to adjust timing, and it is also fed to the Actel N162 which carries out all the timing decoding. Status information is indicated by LEDs. The FIFO outputs are fed via the latch N67.

The Frame Store Option (shown in the middle at the bottom) is a plug in module which is not fitted in the ARC 150 system.

Input Stages (ARCOPI2A Sheet 2)

The parallel data stream from the Interpolator card via the backplane is de-multiplexed into separate 13.5MHz 10-bit luminance and chrominance streams by latch N40 with N80, N81, N130. This enables the data stream to be fed via the backplane to the Interpolator card.

The luminance and chrominance data returns from the Interpolator via a line delay (N143, N10, N144) to two 10-bit registers N70, N72. The registered output is applied to the filter IC N121. This allows the video gain to be adjusted for blanking using coefficients loaded into the IC. N121 also re-multiplexes the Y and C data into a single 27MHz data stream conforming to the 601 specification.

N163 carries out the black level correction and it also generates all the control data for blanking. Its main output is YCB(9,0); the lower bus is similar but the luminance has been low-pass filtered ready for gamut correction.

Test patterns are generated by N109 and N110. N109 is switched into circuit in place of the video contains the eight msb's of the pattern information and the lower 2 bits are contained in N110.

Encode Pre-Process (ARCOPI2A Sheet 3)

The main data path from N163 (sheet 2) is fed to N22. The other input from N163 is fed to the Gamut Limit circuit. In this circuit the data is de-

multiplexed - the luminance path is N170, N169, N173 and the chrominance path is N165-N167.

The chrominance is further separated into Cb and Cr. This makes it possible to compute whether the equivalent GBR values would be legal. N42 and N43 compute the phase and magnitude of the chrominance signals respectively. The phase is compared with the luminance in N135. The result is compared in N44 with the actual value, which is the magnitude data fed via N168, N172. The result is a signal which, when the colour value is illegal, tells the system how much to reduce the chrominance by to correct it.

The error gain signal is fed to the Actel N22 which carries out the appropriate adjustment of the chrominance signal gain.

The luminance notch circuit on the drawing is not used in the ARC 150. The output of the notch and gamut circuits are multiplexed onto a single bus by N122, N123.

N22 has two separate outputs. The luminance bus carries normal luminance and luminance with a notch (when implemented). The chrominance bus carries normal chrominance and gamut limited chrominance.

Pal N85 generates all the clocks for items on this circuit.

D1 Outputs (ARCOPI2A Sheet 4)

The Y and C busses from N22 (sheet 3) are applied to the output formatter N152. This can select luminance with or without notch and chrominance with or without gamut.

N146 is for embedded audio but is not implemented in the ARC 150.

The output of N152 is a parallel data stream in 656 format which is fed to the serialiser N46. This produces two serial data outputs.

PAL N86 is only used to route the clock signal in this application.

Genlock Input (ARCOPI2A Sheet 5)

The reference input is fed via a hum-cancelling circuit comprising Q37, Q38, Q19 and N55. The output is fed via a low-pass filter to N79 and N2, and to the sync separator IC N9. The sampling switch N6-11 operates during the back porch period to clamp the sync signal to a known value. N79 is part of a second loop with N3 to provide a.g.c. The output of the sync circuit is applied to the analogue-to-digital converter N153.

Technical Description

D1 Genlock (ARCOPI2A Sheet 6)

Actel N48 is the Genlock sync pulse generator. The multiplier N21 and look-up table N158 circuits accept the input from the A-D converter (N153, sheet 5) and gate the data to produce a weighted average of the sync edge so that a measurement of the sync position can be made. The REFSYNC input (from N9, sheet 5) is also applied directly to N48.

The output of N48 is fed to the integrator N62 which is gated on by a reference input from N48 via Q20, Q21, Q22. The genlock error appears at TP5. The error is fed via N37 to the variable oscillator N88, which provides the main clock reference.

The clock distribution is from the PAL N39. Clocks are fed to the backplane via N129, directly to the sync pulse generator, and via a clock multiplier N77 so that 13.5MHz and 27MHz can be fed out via N102 and N103.

Register N132 takes the outputs from the sync pulse generator and feeds them on to the backplane.

Control Processor (ARCOPI2A Sheet 7)

The system is controlled by the microprocessor N14 in conjunction with flash memory N136 and static RAM N7 and N11. Non-volatile RAMs N115 and N175 provide memory during power-down.

The switches and indicators which are on the front edge of the card are shown in the centre of the sheet. SW3 and SW4 are used to set the network address.

The switches and indicators at the top-left of the sheet (SW2, SW7, SW8, D45, D11, D9, D8) are microprocessor specific, either directly or for diagnostics.

For factory diagnostics purposes, there is a socket on the front edge of the card which allows serial connection to the microprocessor via N12.

The CPU control ACTEL N26 communicates with N14 via bus CPUD(7:0), with the card edge menu system and with the backplane (System Control Bus) to control the Interpolator card.

A connector is provided for the optional front panel which communicates via N26 and the gates of N137.

Comms and Power (ARCOPI2A Sheet 8)

This sheet shows the communications to circuits external to the unit.

N19 is an ARCNET controller. N45 is a dual UART used for RS-422/RS-262 functions. There is also a UART in the microprocessor. The PAL N18 allows any of these four to be routed to any communication channel.

There are two RS-422 interfaces (N23/N24 and N16/N17). Only the REM channel (N16, N17) is connected to the rear panel.

The third interface is for Rollcall, a network type of communications interface (Q2, Q3, Q5, Q6, Q7, Q9, N20 and associated components).

Technical Description

CONTROL PANEL (ARCF1U3X) - Option

This provides the user interface and comprises two circuits.

Sheet 1

Communication with the main part of the ARC 150 is via the interface Actel N1. The Actel drives the displays N4, N5, N10, N11, N13, N14; the 20 characters are constructed out of two 8 character displays and one 4 character display.

N3 provides the drive for the LED indicators in the pushbuttons.

RV1 is the front panel variable control used for selecting menu items.

Sheet 2

This sheet shows the front panel switches and indicators.

Technical Description

GPI INTERFACE CARD (ARCGPI2X) - Option

This is a small card mounted on the inside of the rear panel which provides an interface between external contact closures and the processor on the OPI card.

There are four contact closure channels and each is fed to an opto-isolator. When the contact is closed, the opto-isolator is switched off.

The output of the opto-isolators is fed to PAL N1 which interfaces to the OPI card via a socket on the this card.

Circuit Diagrams

Block Diagram

ARC150

Interpolator

ARCINT1A

ARCINT1A	Top Level Drawing
INT1A_01	Field Store Control
INT1A_02	Field Stores
INT1A_03	Field Store 1
INT1A_04	Field Store 2
INT1A_05	Field Store 3
INT1A_06	Field Store 4
INT1A_07	Field Store 5
INT1A_08	Field Store 6
INT1A_09	Field Store Switching
INT1A_10	Line Stores (1)
INT1A_11	Line Stores (2)
INT1A_12	Line Stores (3)
INT1A_13	Line Stores (4)
INT1A_14	Line Stores (5)
INT1A_15	Coefficient Control
INT1A_16	Interpolation Arithmetic
INT1A_17	Output Field Store 1
INT1A_18	Output Field Store 2
INT1A_19	Output Clip
INT1A_20	Horizontal Rate Converter
INT1A_21	Horizontal Rate Converter
	Coefficient Control
INT1A_22	Horizontal Rate Converter
	Luma Interpolator
INT1A_23	Horizontal Rate Converter
	Chroma Interpolator
INT1A_24	Horizontal Rate Converter
	Bypass Delay
INT1A_25	F & H Pulse Inputs
INT1A_26	Clock Buffering
INT1A_27	Microprocessor & Memory
INT1A_28	Power In and Decoupling
INT1A_29	+5V Decoupling
INT1A_30	-5V Decoupling
INT1A_31	PCB Mechanics

Output Processor

ARCOPI2A

Sheet 1	Serial Input
Sheet 2	Input Stages
Sheet 3	Encode Pre-process
Sheet 4	D1 Outputs
Sheet 5	Genlock Input
Sheet 6	D1 Genlock
Sheet 7	Control Processor
Sheet 8	Comms and Power

Backplane

ARCB1U1Y

Sheet 1
Sheet 2
Sheet 3

Control Panel

ARCF1U3X

Sheet 1
Sheet 2

GPI Interface

ARCGPI2X

INT2				INT1			
PKG_TYPE=CN41612.PRESS PKG_TYPE=CN41612.PRESS PKG_TYPE=CN41612.PRESS				PKG_TYPE=CN41612MN.PRESS PKG_TYPE=CN41612MN.PRESS PKG_TYPE=CN41612MN.PRESS			
PIN	A	B	C	PIN	A	B	C
1	GND	GND	GND	1	+5V	+5V	+5V
2	INTF	INTV	INTY0	2	+5V	+5V	+5V
3	INTY1	INTY2	INTY3	3	-5V	-5V	-5V
4	INTY4	INTY5	INTY6	4	GND	GND	GND
5	INTY7	INTY8	INTY9	5	+12V	+12V	+12V
6	GND	GND	GND	6	-12V	-12V	-12V
7	INTH	INTCA	INTC0	7	GND	GND	GND
8	INTC1	INTC2	INTC3	8	AD0	AD1	ALE
9	INTC4	INTC5	INTC6	9	AD2	AD3	RD
10	INTC7	INTC8	INTC9	10	AD4	AD5	WR
11	GND	GND	GND	11	AD6	AD7	BRQ
12	GPI0	GPI1		12	GND	GND	GND
13				13	OPICK+	OPICK-	CN113C
14				14	GND	GND	GND
15				15	CN115A	CN115B	CN115C
16	GND	GND	GND	16	GND	GND	GND
17	GPI2	GPI3					
18							
19							
20							
21	GND	GND	GND				
22	CNFF	CNFV	CNFY0				
23	CNFY1	CNFY2	CNFY3				
24	CNFY4	CNFY5	CNFY6				
25	CNFY7	CNFY8	CNFY9				
26	GND	GND	GND				
27	CNFH	CNFC A	CNFC0				
28	CNFC1	CNFC2	CNFC3				
29	CNFC4	CNFC5	CNFC6				
30	CNFC7	CNFC8	CNFC9				
31	OPIIF	OPIV	OPIH				
32	GND	GND	GND				

INT2A				INT2B				INT2C			

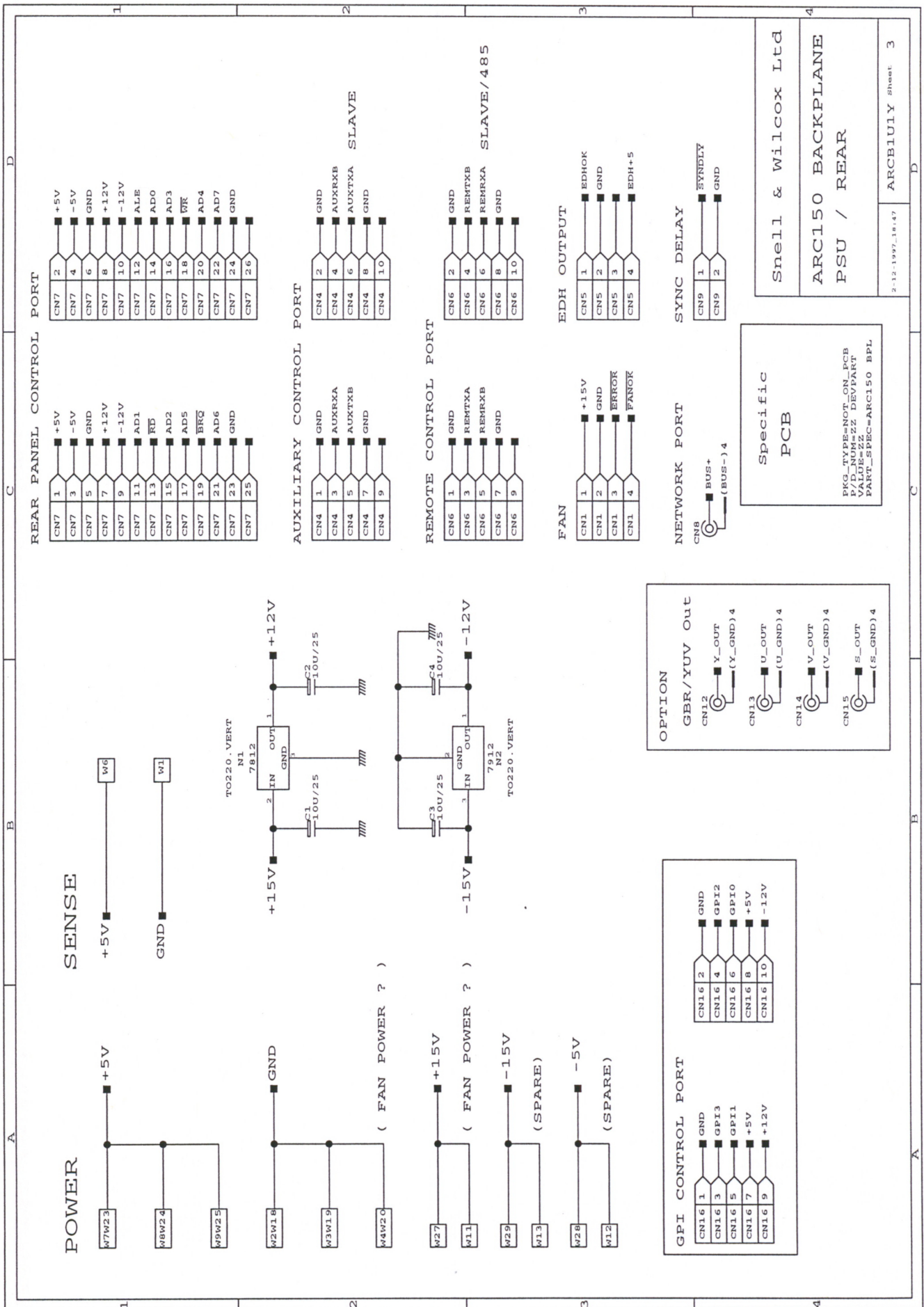
SECTION 7

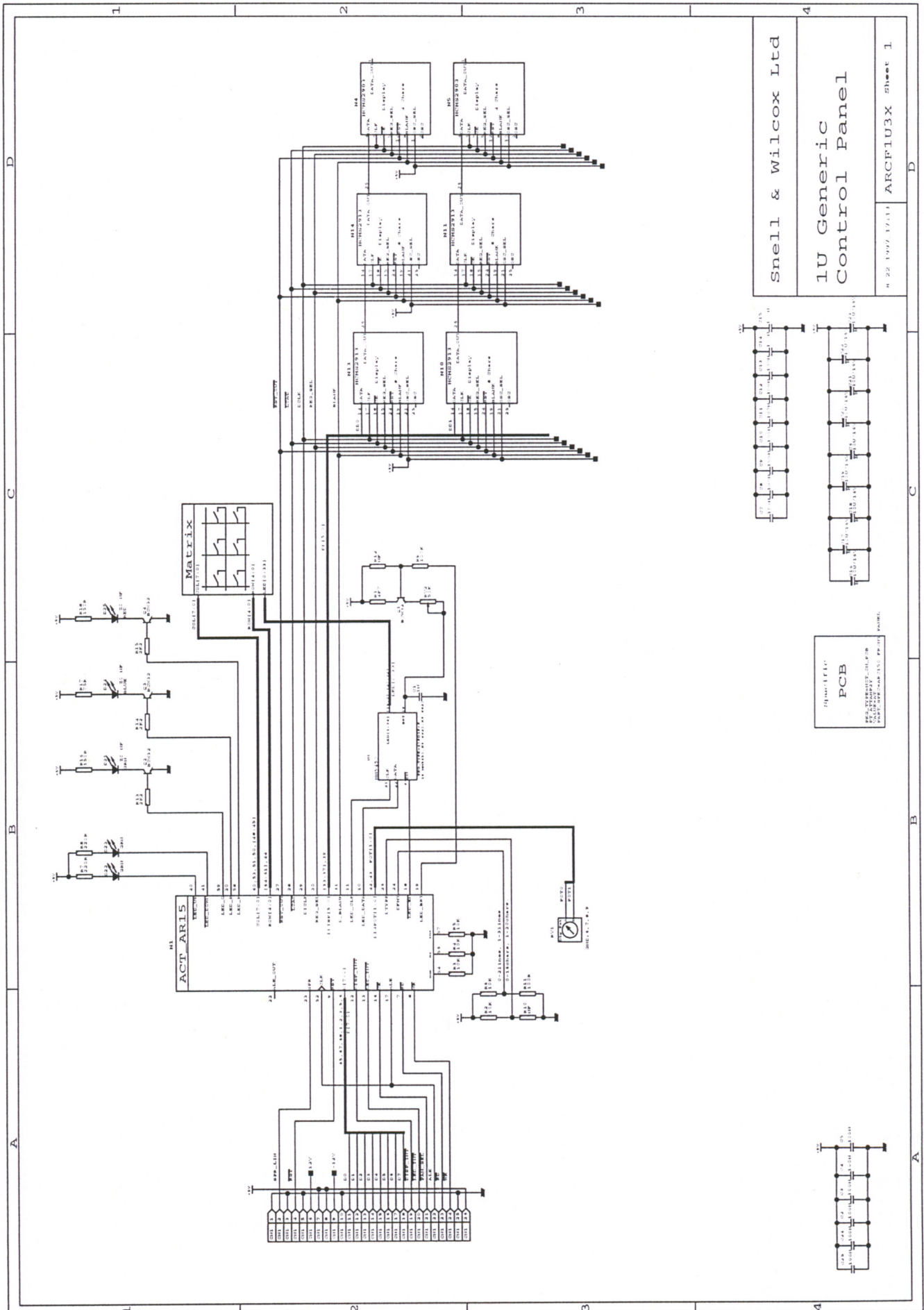
A				B				C				D			
OPI3				OPI2				OPI1				OPI0			
PIN	A	B	C	PIN	A	B	C	PIN	A	B	C	PIN	A	B	C
1	656 LOOP	(SER OUT 3)		1	GND	GND	GND	1	+5V	+5V	+5V	1	+5V	+5V	+5V
2				2	INTF	INTV	INTY0	2	+5V	+5V	+5V	2	+5V	+5V	+5V
3				3	INTY1	INTY2	INTY3	3	-5V	-5V	-5V	3	-5V	-5V	-5V
4	656 IN	(COMPOSITE)		4	INTY4	INTY5	INTY6	4	GND	GND	GND	4	GND	GND	GND
5				5	INTY7	INTY8	INTY9	5	+12V	+12V	+12V	5	+12V	+12V	+12V
6				6	GND	GND	GND	6	-12V	-12V	-12V	6	-12V	-12V	-12V
7				7	INTH	INTCA	INTC0	7	GND	GND	GND	7	GND	GND	GND
8				8	INTC1	INTC2	INTC3	8	AD0	AD1	ALE	8	AD0	AD1	ALE
9				9	INTC4	INTC5	INTC6	9	AD2	AD3	RD	9	AD2	AD3	RD
10	GND			10	INTC7	INTC8	INTC9	10	AD4	AD5	WR	10	AD4	AD5	WR
11	REMTXA	OPIPK-	GND	11	GND	GND	GND	11	AD6	AD7	BRQ	11	AD6	AD7	BRQ
12	REMTXB	OPIGND2	OPIGND1	12	CNFF	CNFF	CNFF0	12	GND	GND	GND	12	GND	GND	GND
13	REMRXA	OPIP9-	OPIP9+	13	CNFF1	CNFF2	CNFF3	13	OPIPK+	OPIPK-	CH13C	13	OPIPK+	OPIPK-	CH13C
14	REMRXB	OPIP8-	OPIP8+	14	CNFF4	CNFF5	CNFF6	14	GND	GND	GND	14	GND	GND	GND
15	-SLOT-	OPIP7-	OPIP7+	15	CNFF7	CNFF8	CNFF9	15	CN115A	CN115B	CN115C	15	CN115A	CN115B	CN115C
16	ERROR	OPIP6-	OPIP6+	16	GND	GND	GND	16	GND	GND	GND	16	GND	GND	GND
17	FANOK	OPIP5-	OPIP5+	17	CNFFH	CNFFA	CNFFC0	17	OPIPK+	OPIPK-	CH13C	17	OPIPK+	OPIPK-	CH13C
18	SYNDLY	OPIP4-	OPIP4+	18	CNFFC1	CNFFC2	CNFFC3	18	GND	GND	GND	18	GND	GND	GND
19	EDHOK	OPIP3-	OPIP3+	19	CNFFC4	CNFFC5	CNFFC6	19	CN3	CN3	CN3	19	CN3	CN3	CN3
20	EDH+5	OPIP2-	OPIP2+	20	CNFFC7	CNFFC8	CNFFC9	20	CN3	CN3	CN3	20	CN3	CN3	CN3
21	BUS+	OPIP1-	OPIP1+	21	GND	GND	GND	21	CN3	CN3	CN3	21	CN3	CN3	CN3
22	BUS-	OPIP0-	OPIP0+	22				22	CN3	CN3	CN3	22	CN3	CN3	CN3
23	GND	GND	GND	23				23	CN3	CN3	CN3	23	CN3	CN3	CN3
24	REF IN A			24	AUXTXA	AUXTXB	AUXTXB	24	CN3	CN3	CN3	24	CN3	CN3	CN3
25				25	AUXRXA	AUXRXB	AUXRXA	25	CN3	CN3	CN3	25	CN3	CN3	CN3
26				26	S_GND	GND	GND	26	CN3	CN3	CN3	26	CN3	CN3	CN3
27	SER OUT 1			27	S_OUT	Y_OUT	Y_GND	27	CN3	CN3	CN3	27	CN3	CN3	CN3
28				28	AUDALU	U_OUT	U_GND	28	CN3	CN3	CN3	28	CN3	CN3	CN3
29				29	AUDBLU	V_OUT	V_GND	29	CN3	CN3	CN3	29	CN3	CN3	CN3
30				30		REFINP	REFGND	30	CN3	CN3	CN3	30	CN3	CN3	CN3
31	SER OUT 2			31	OPIIF	OPIIV	OPIIH	31	CN3	CN3	CN3	31	CN3	CN3	CN3
32				32	GND	GND	GND	32	CN3	CN3	CN3	32	CN3	CN3	CN3

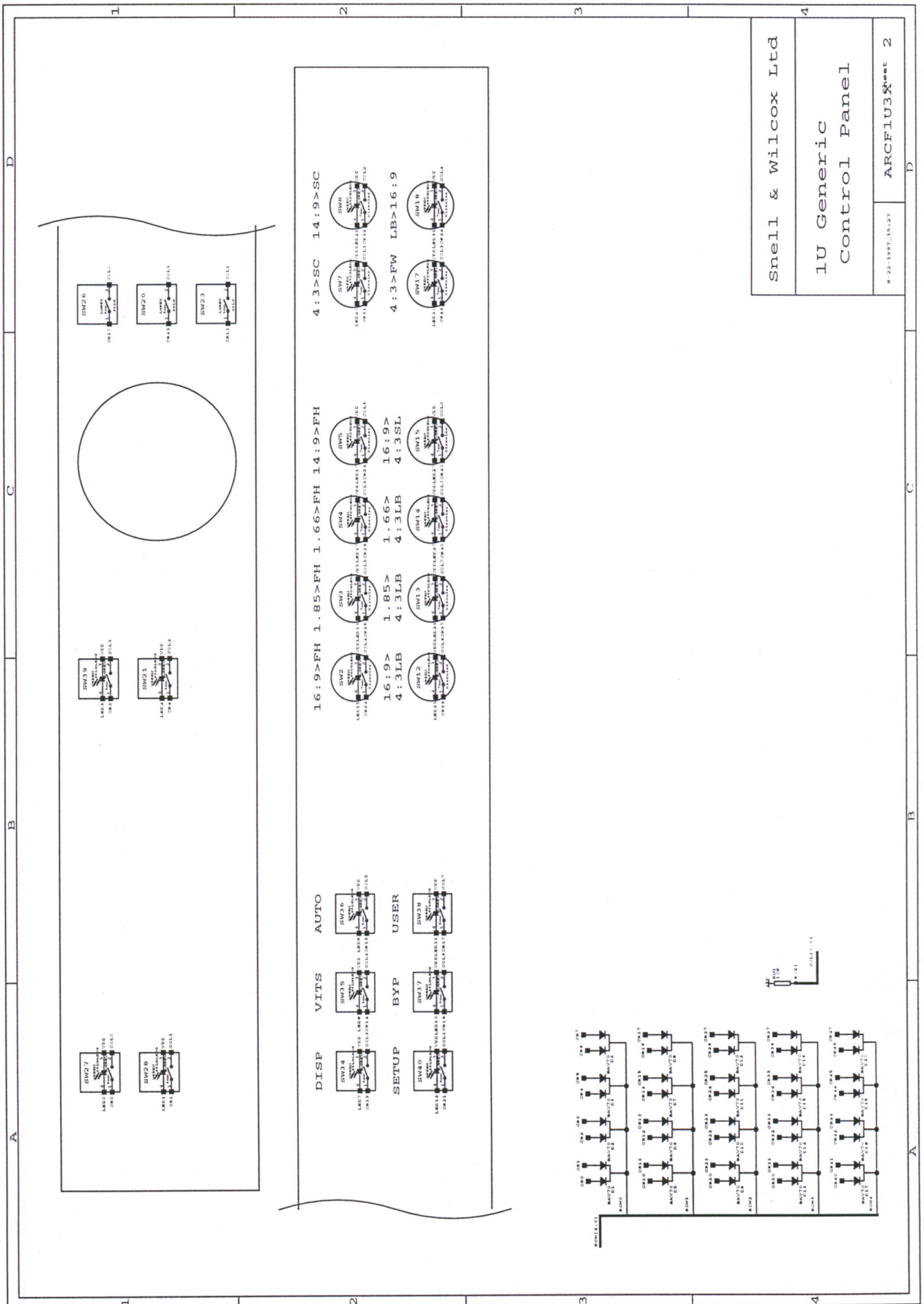
Snell & Wilcox Ltd

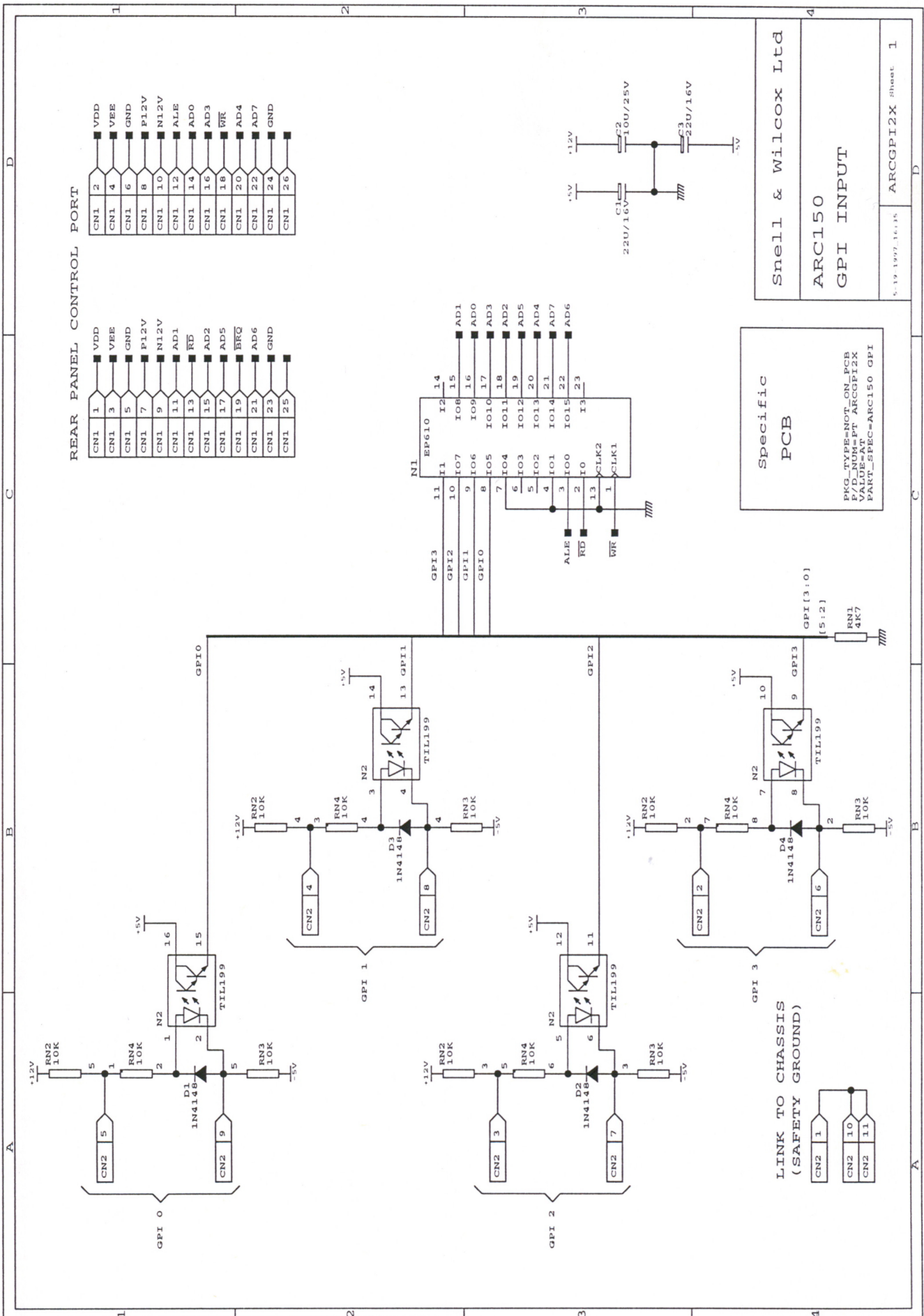
ARC150 BACKPLANE
OPI
Output Interface

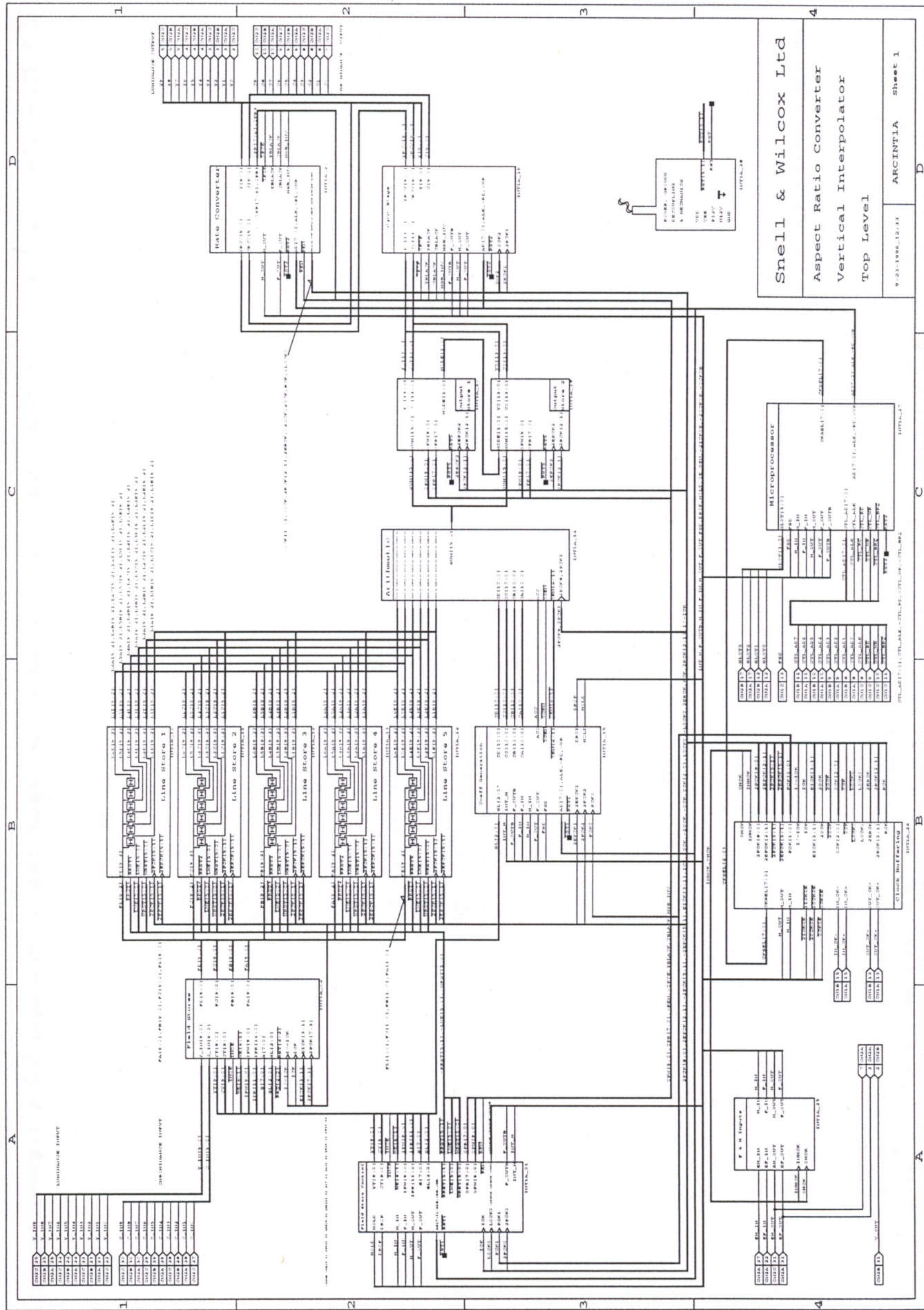
ARCH1U1Y Sheet 2

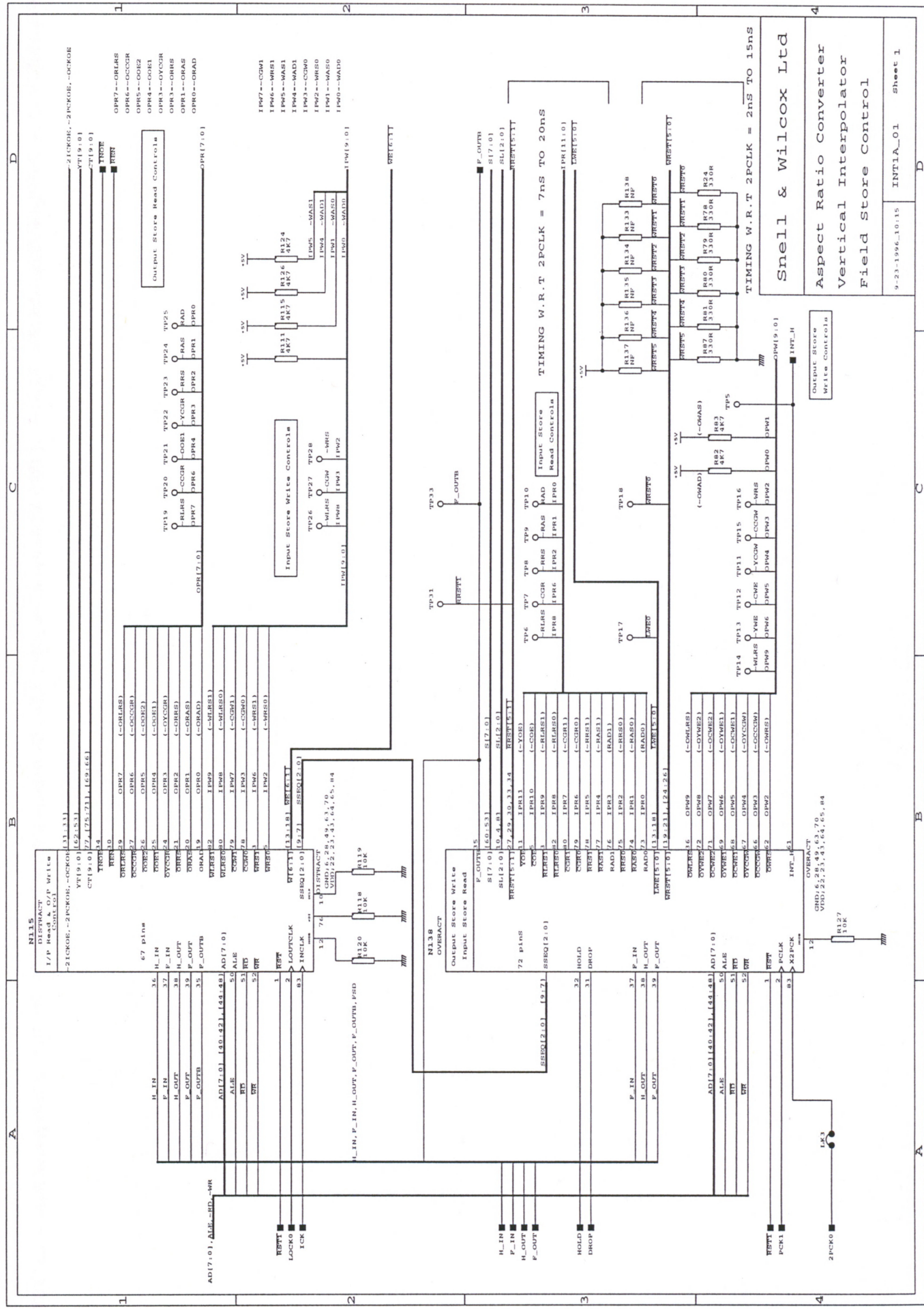


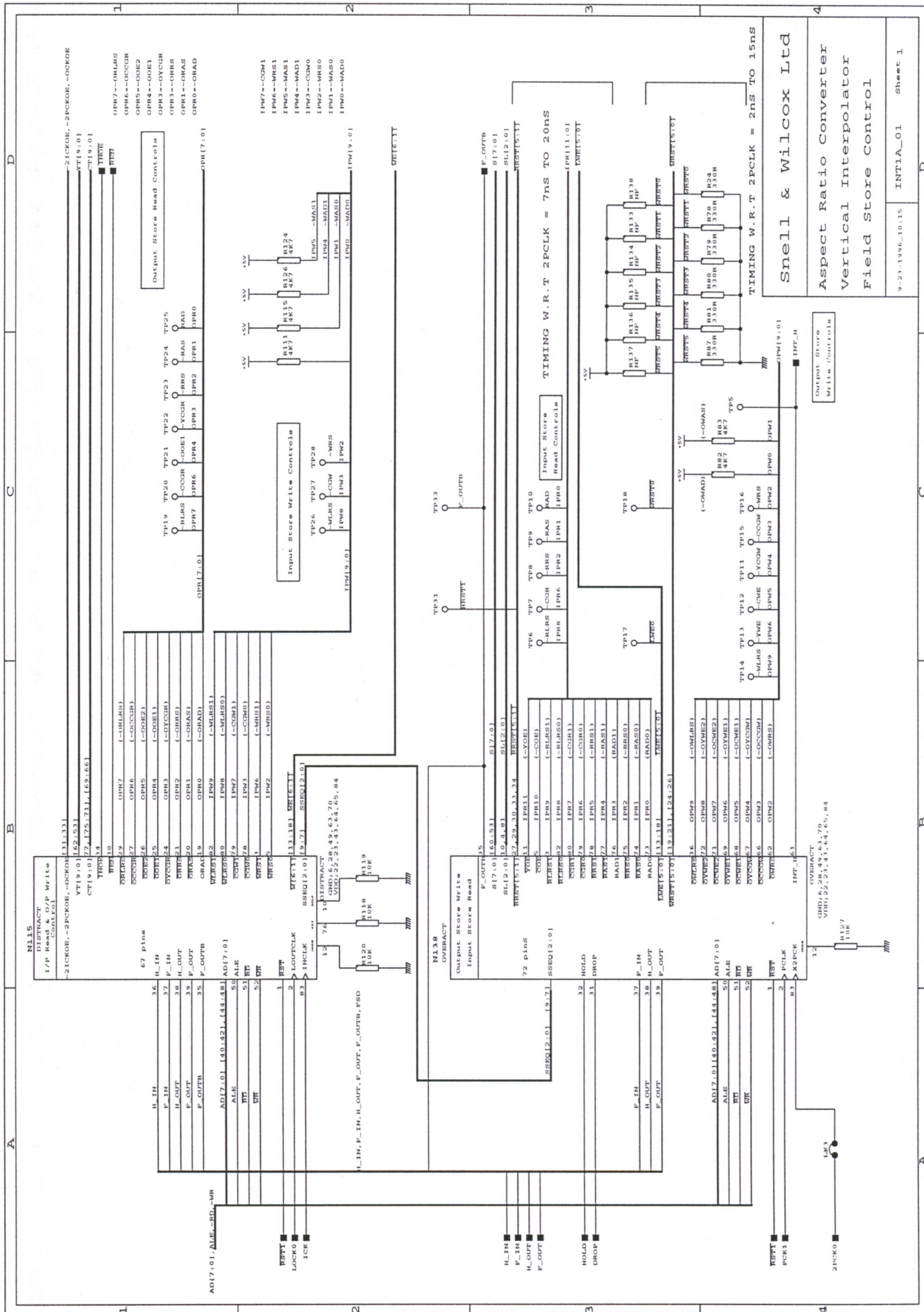


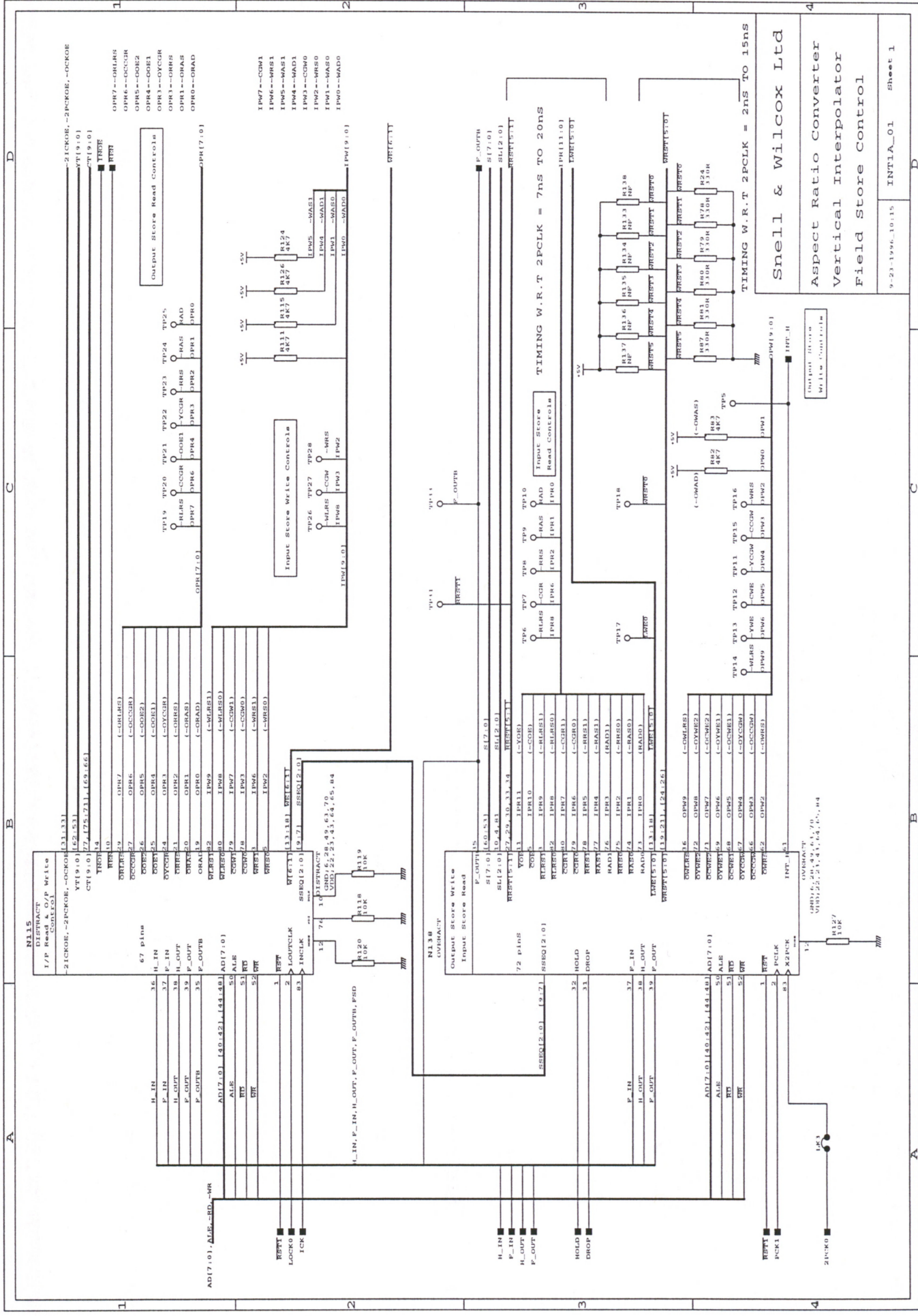


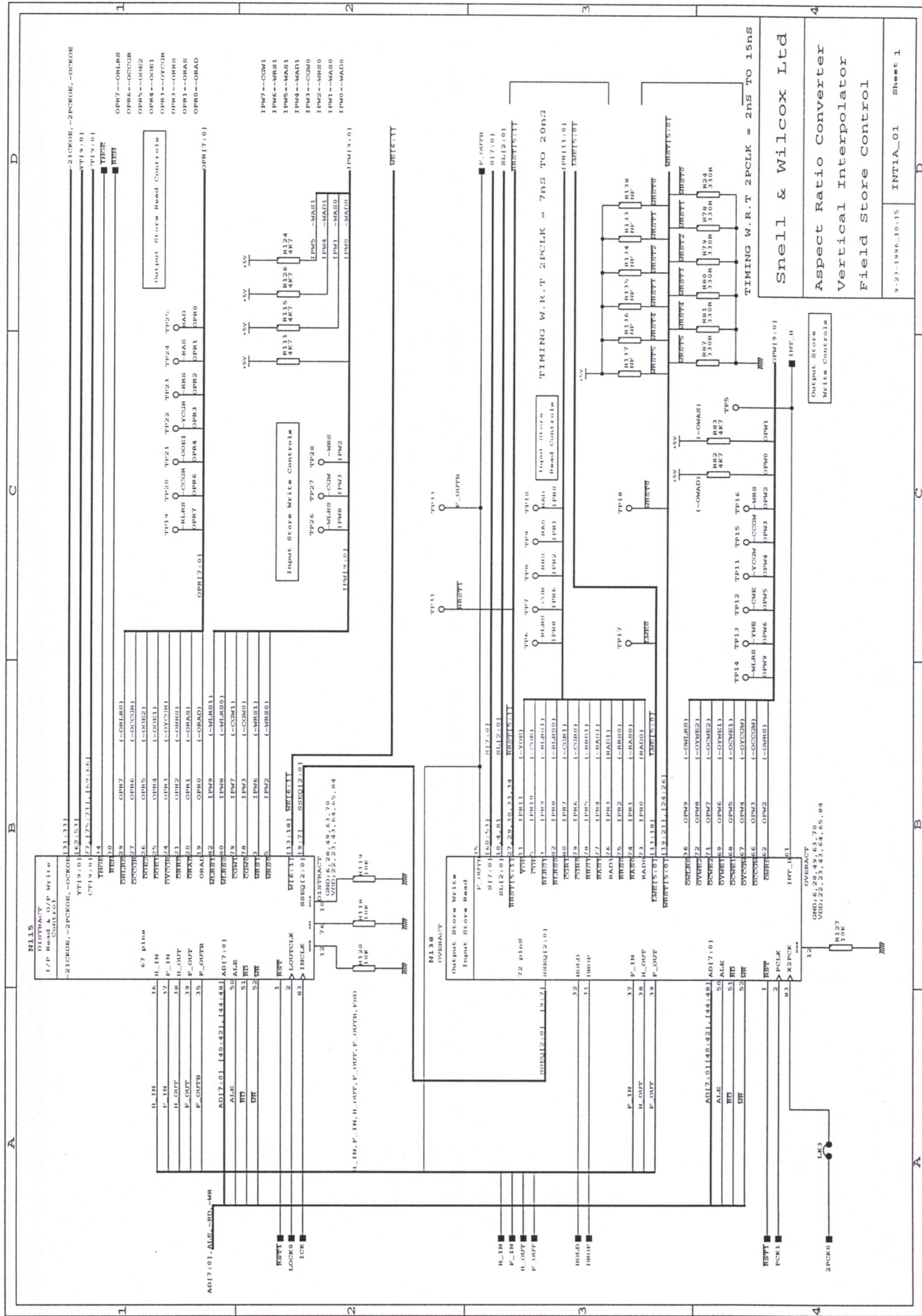


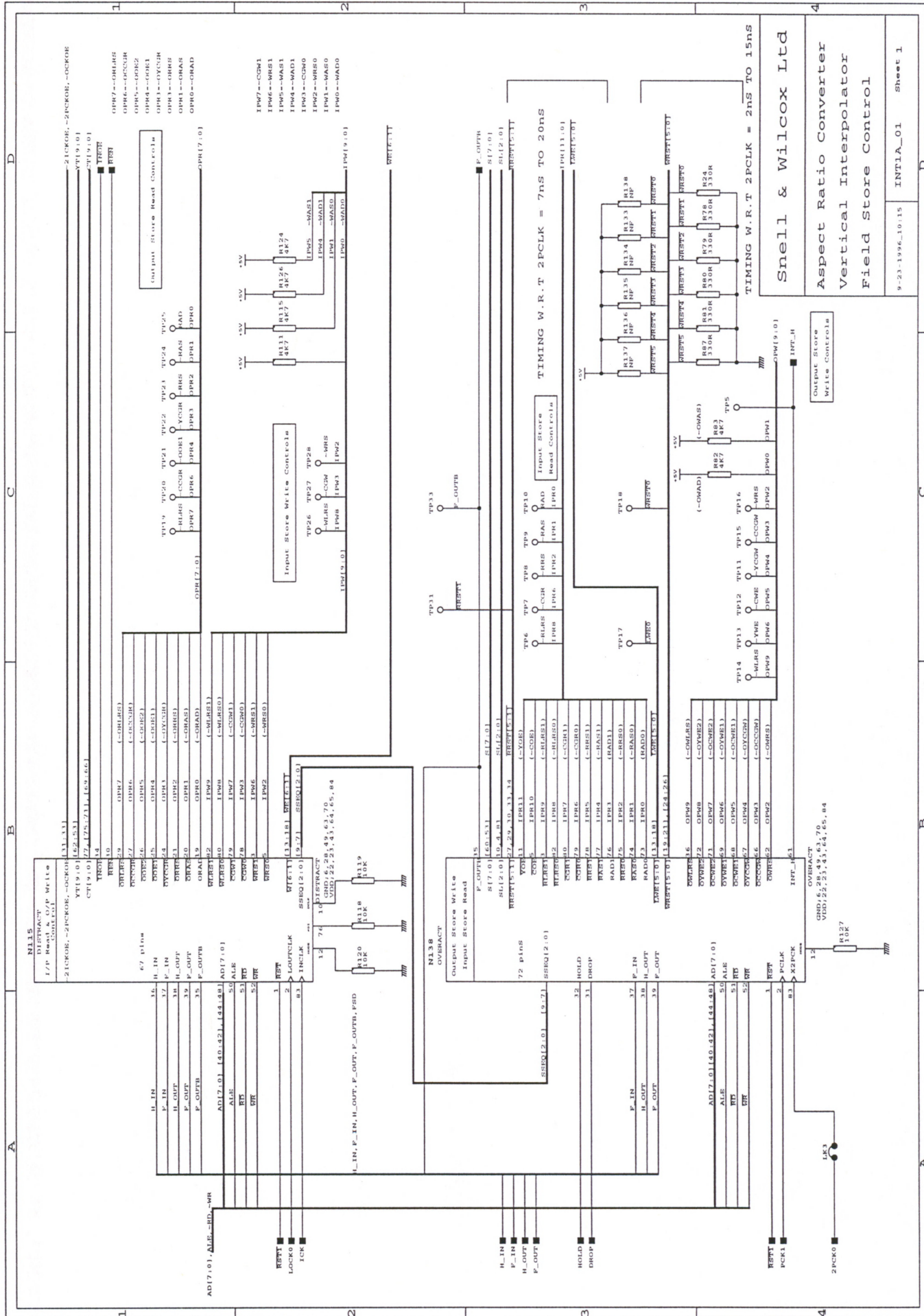


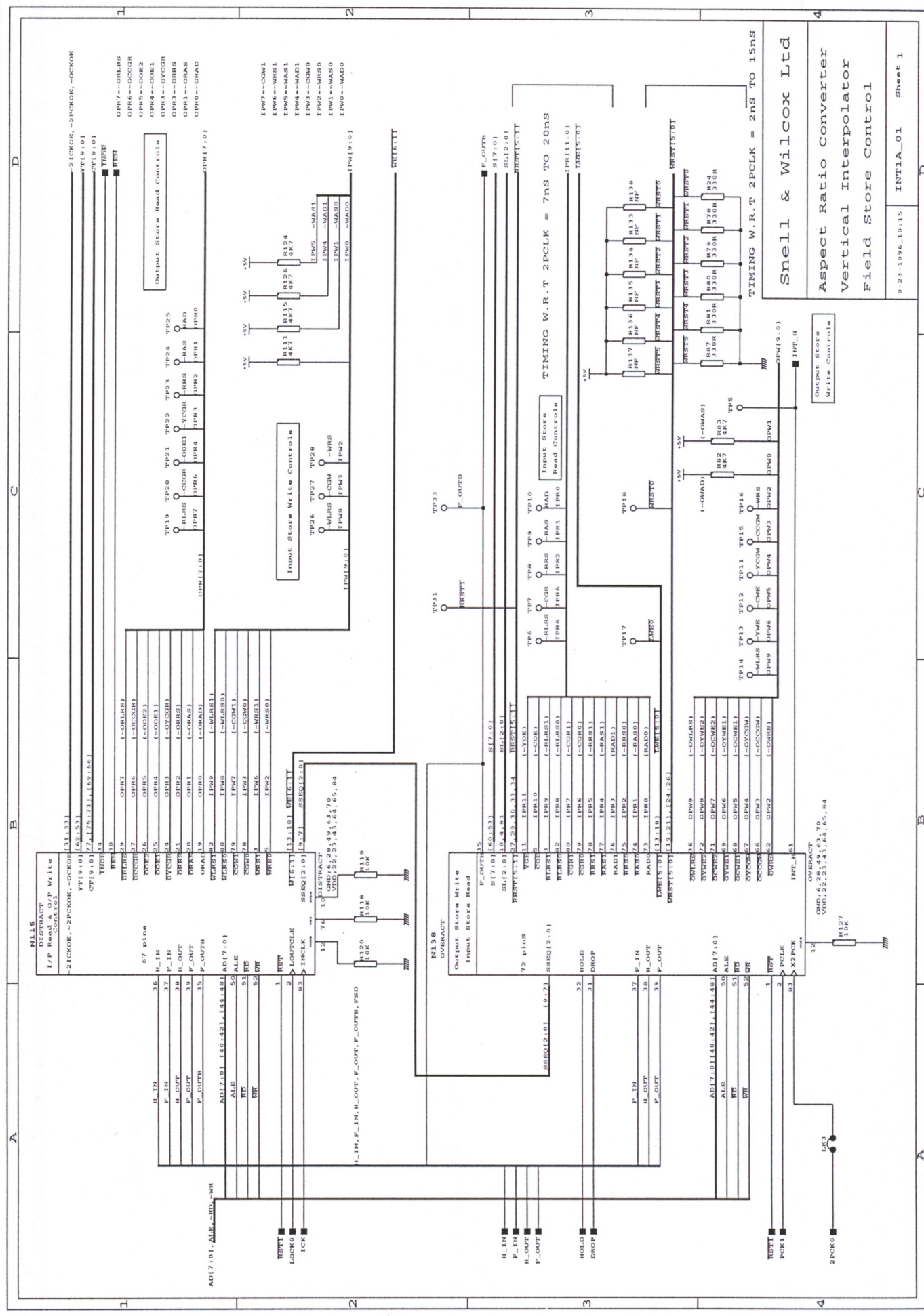


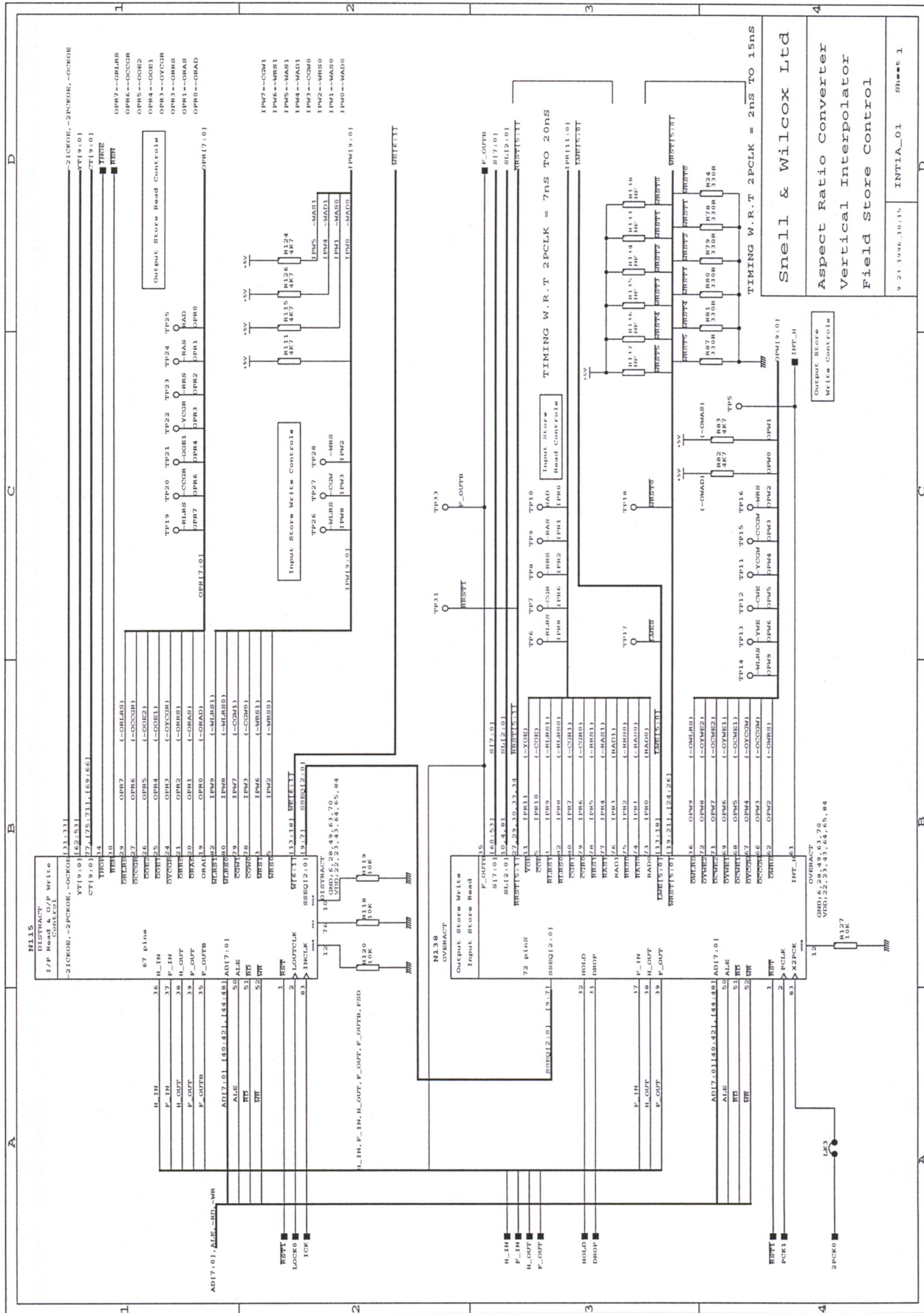


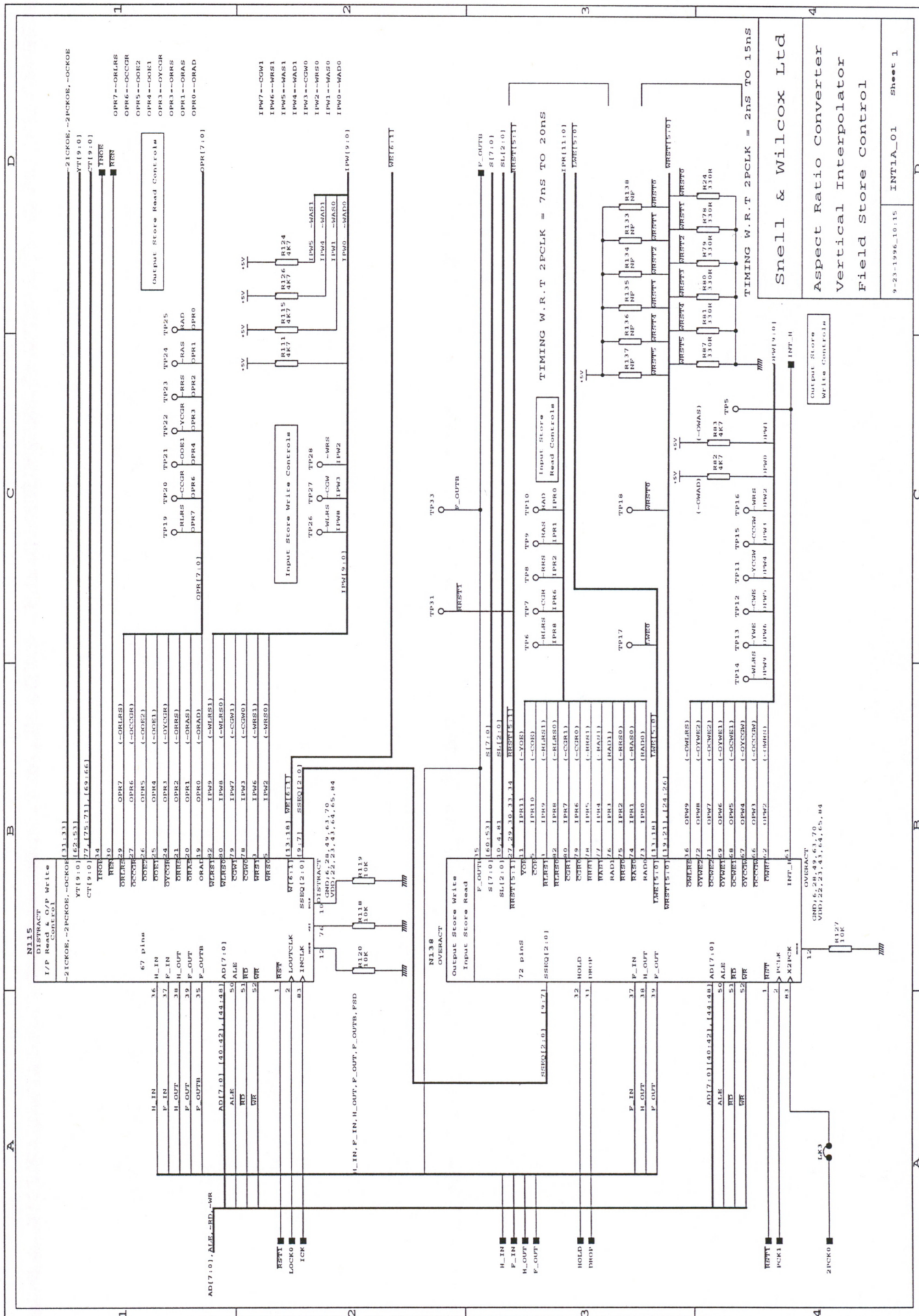


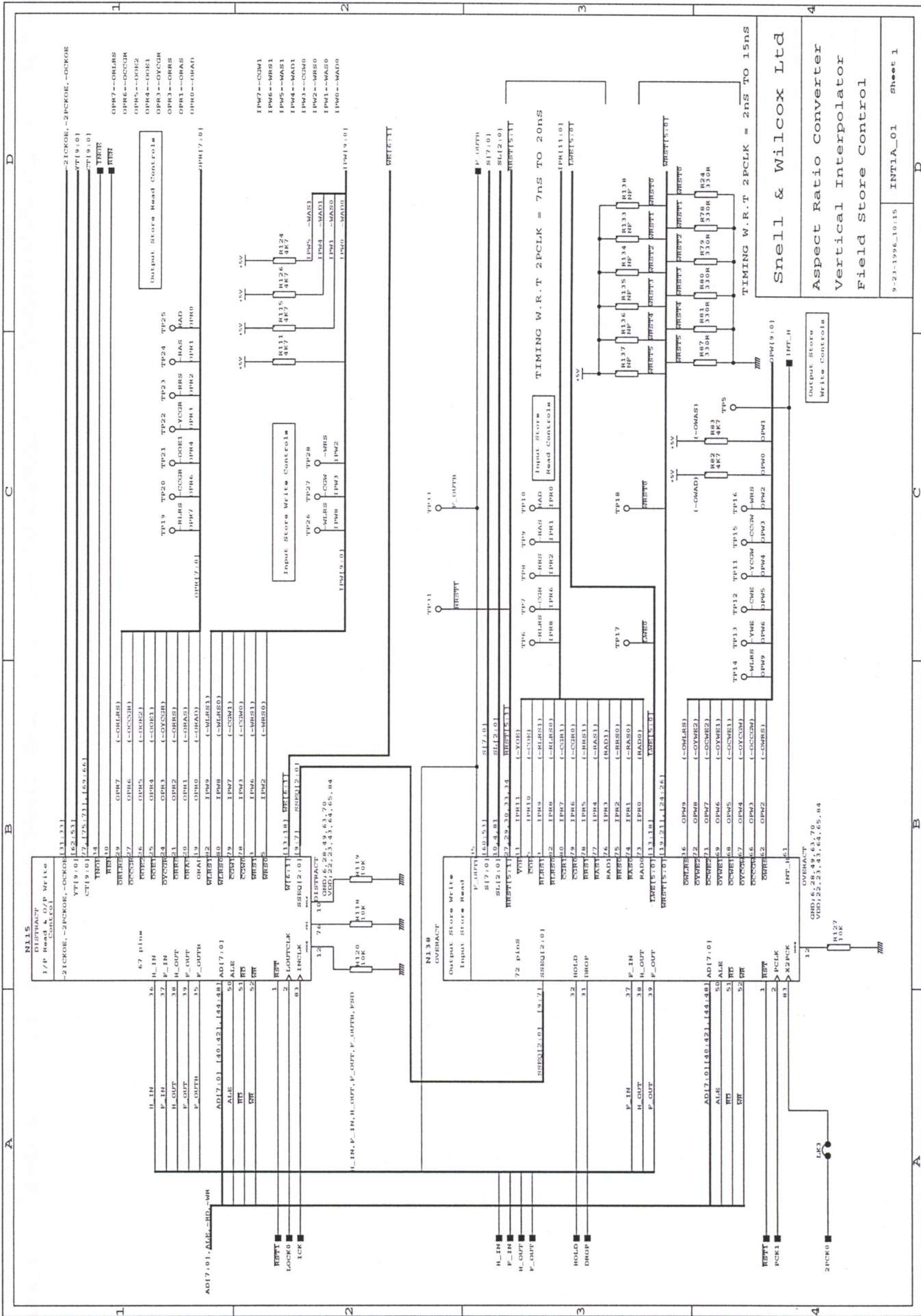


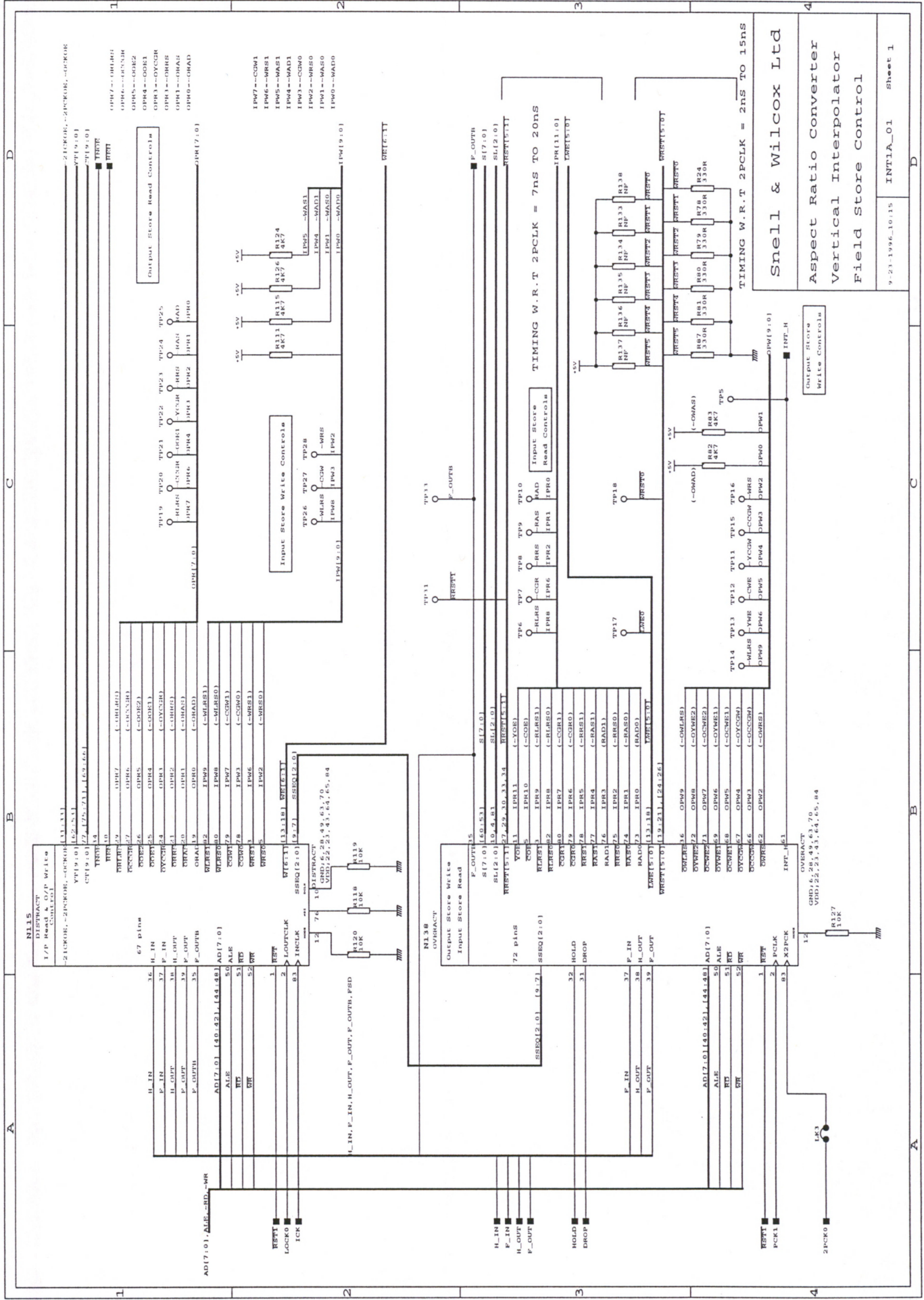


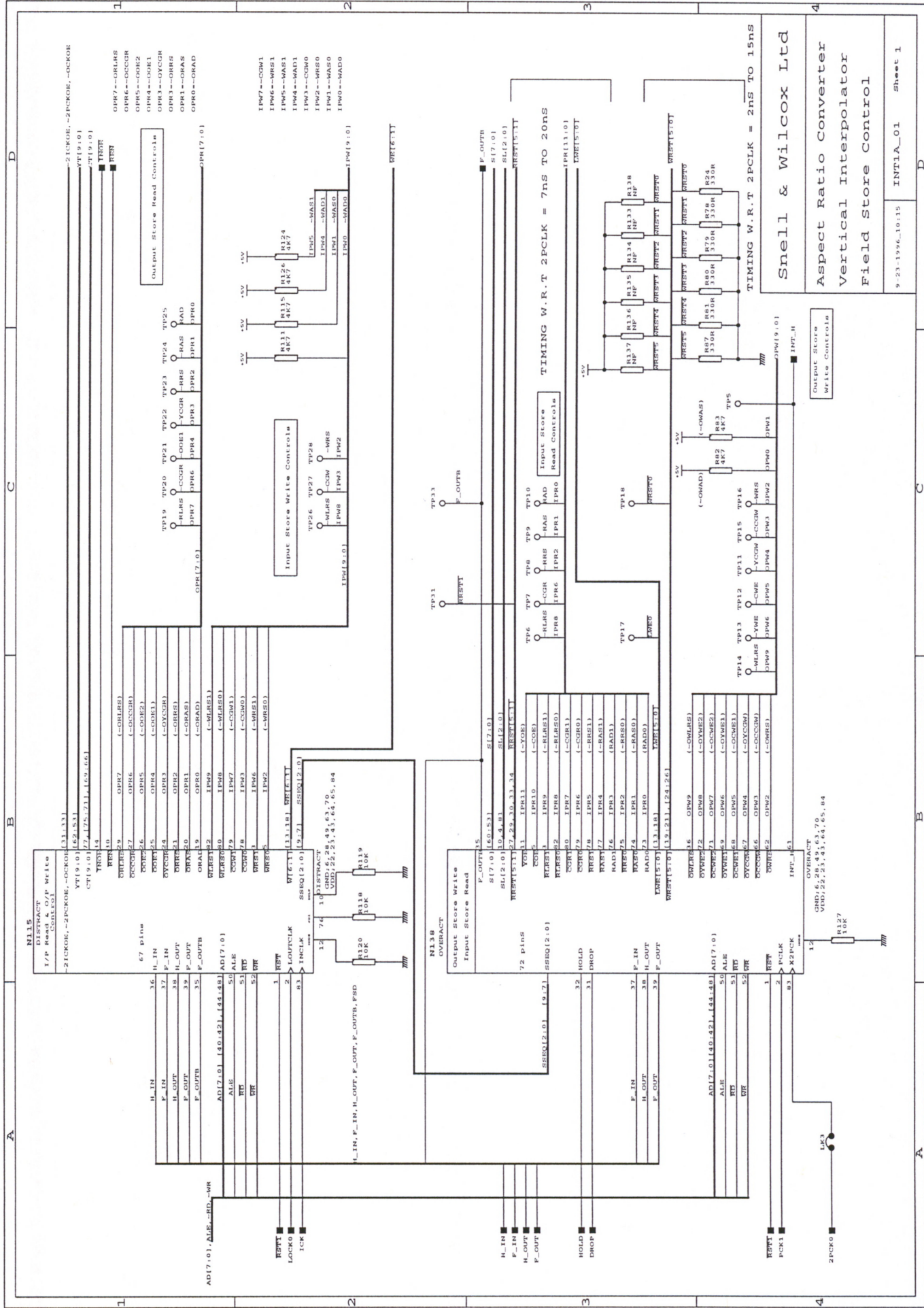


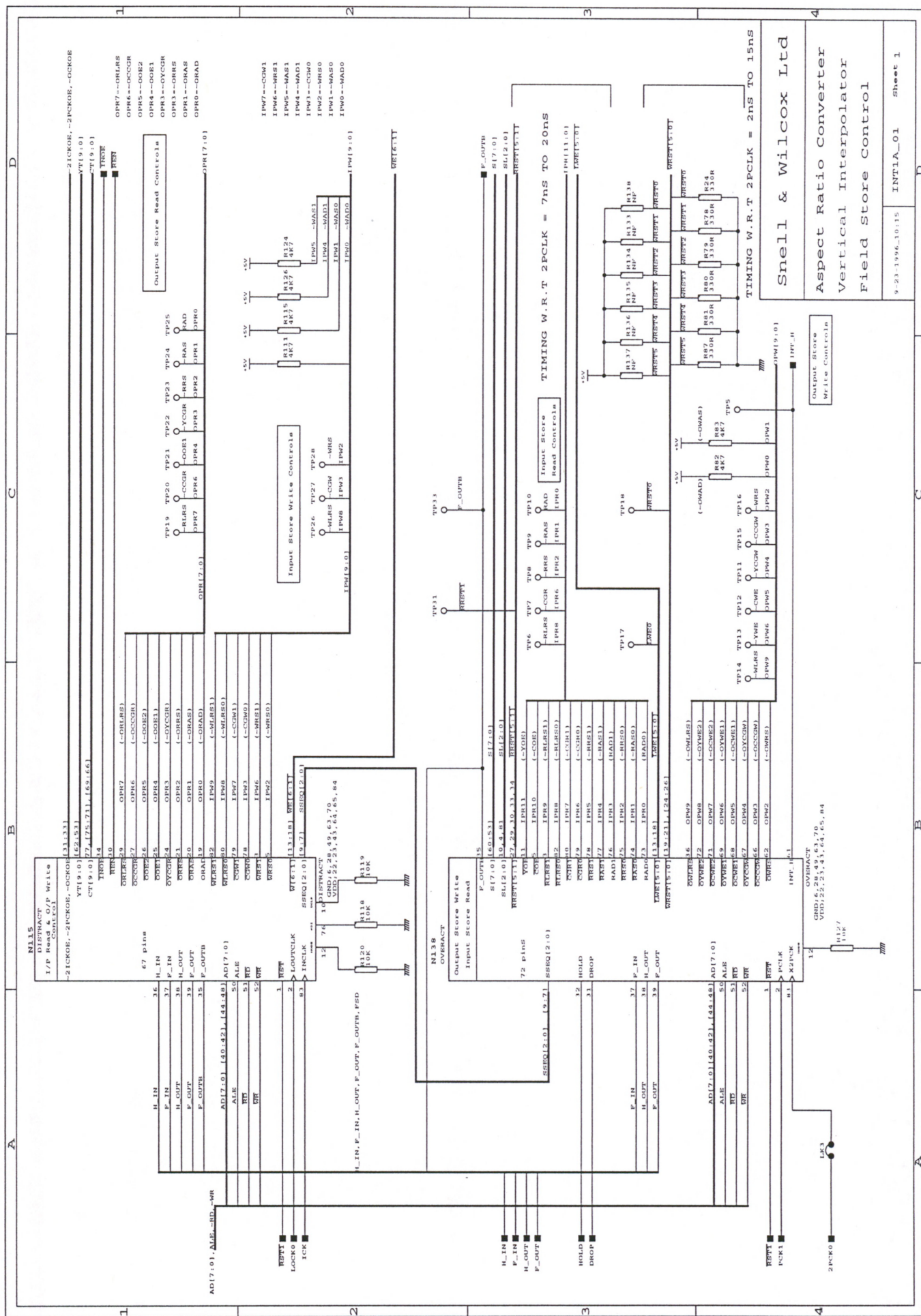


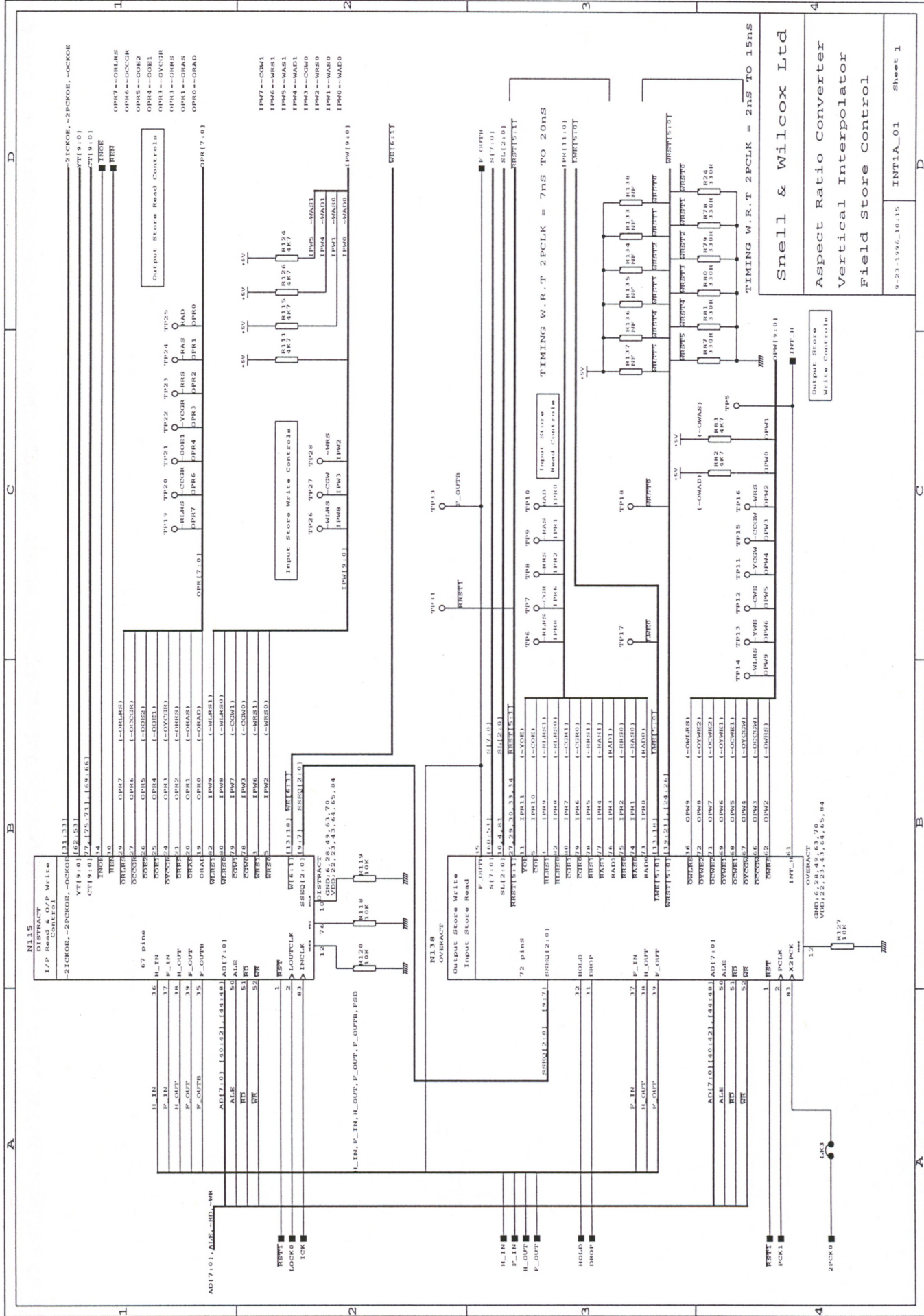


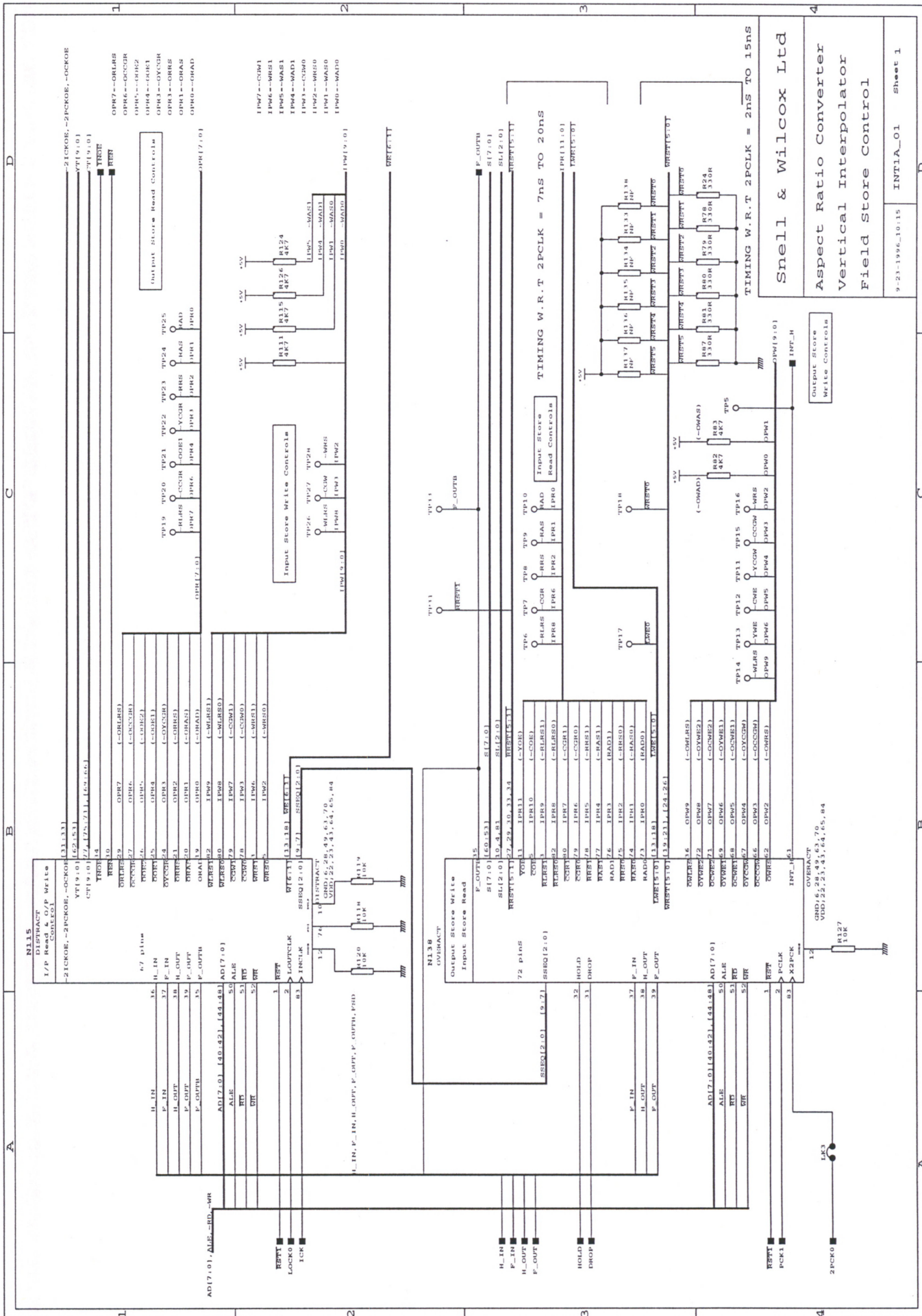


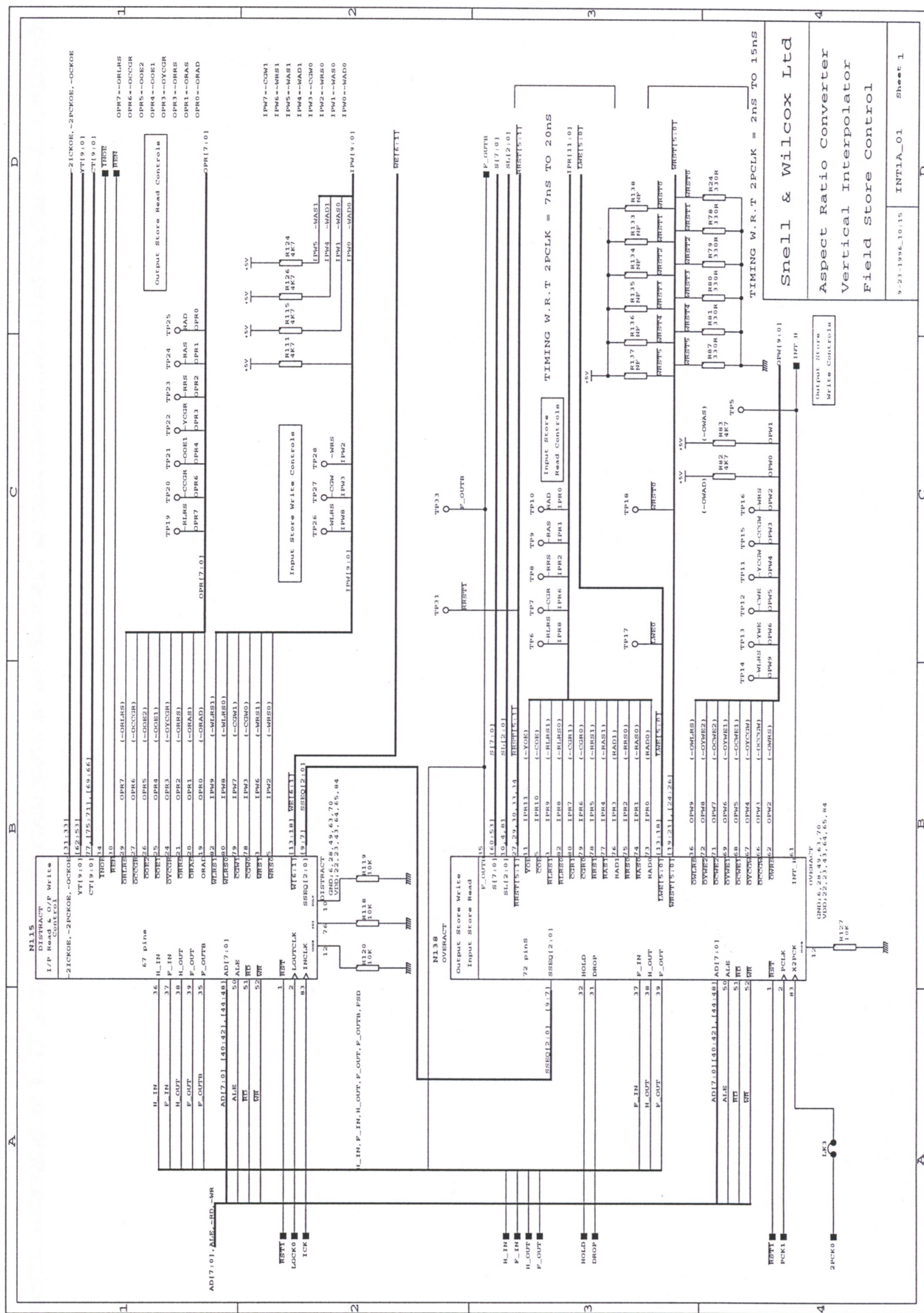


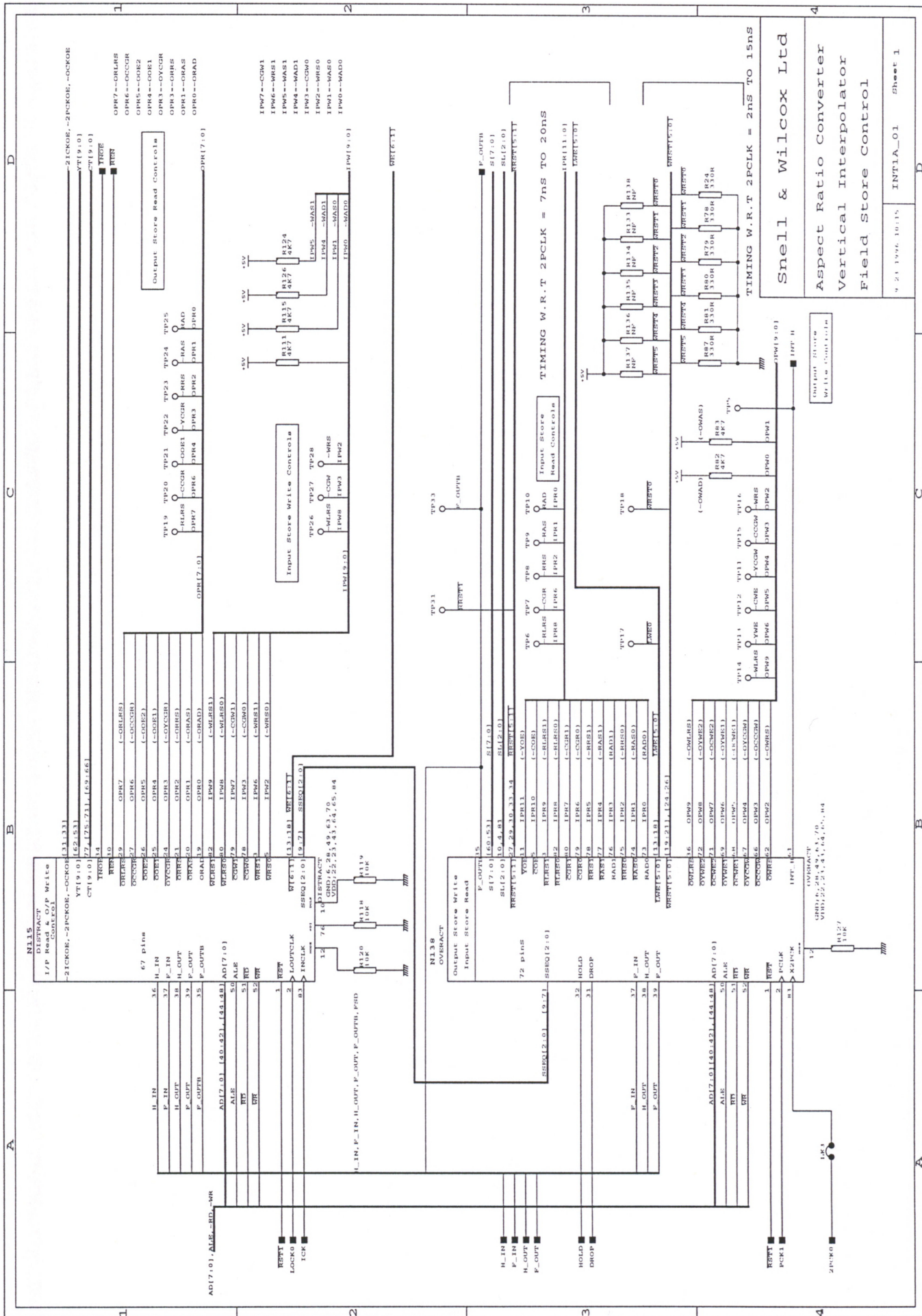


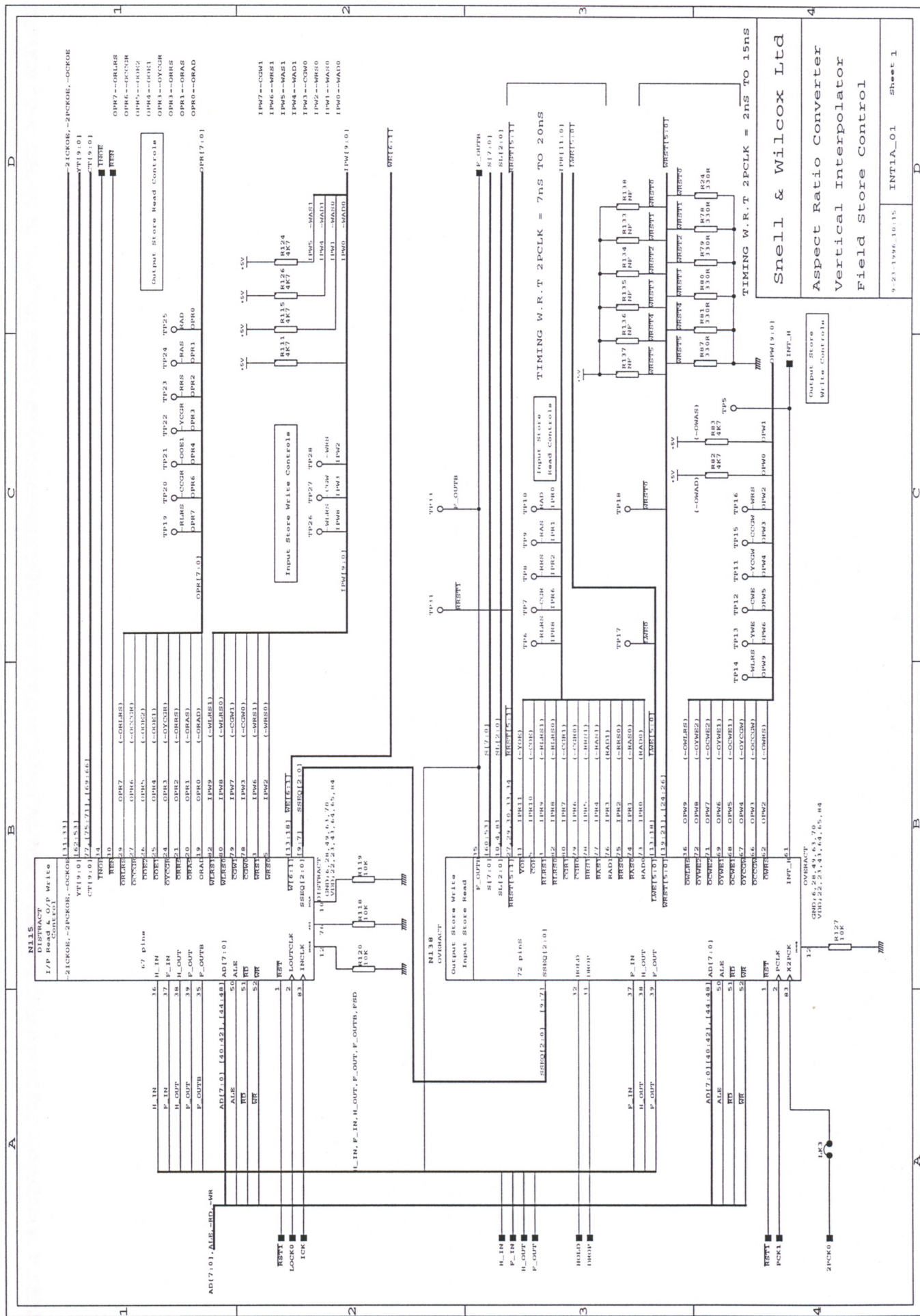


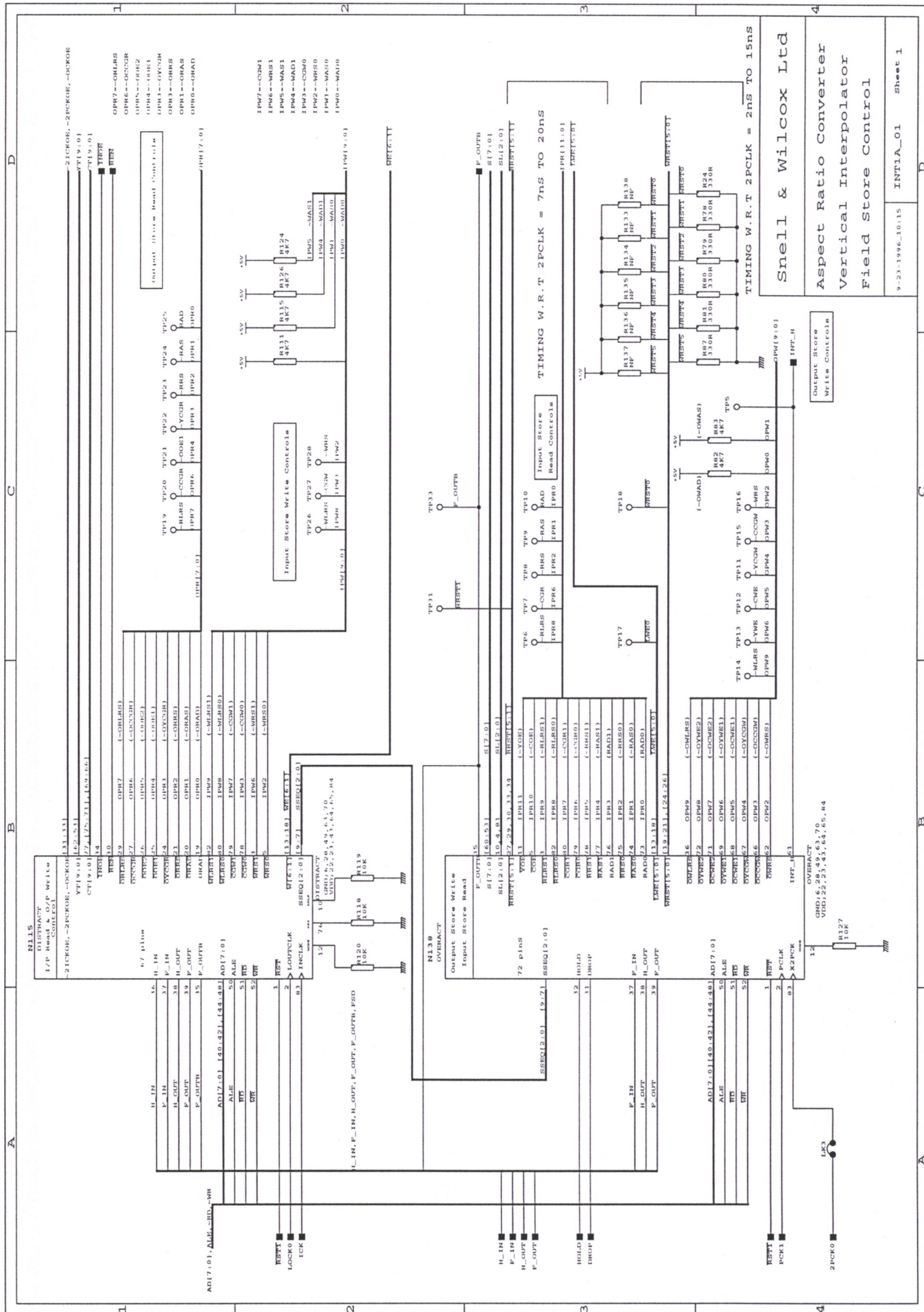


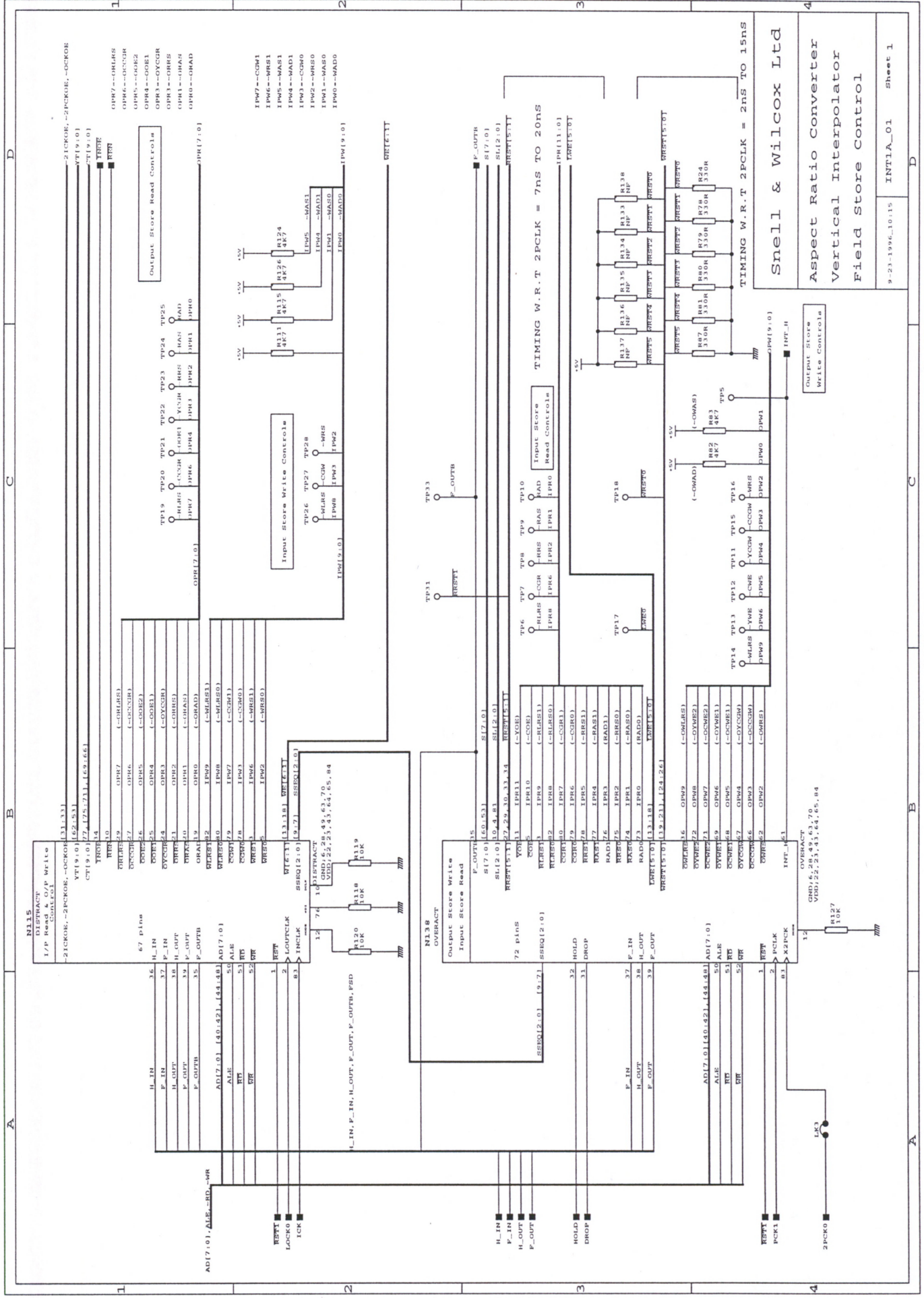


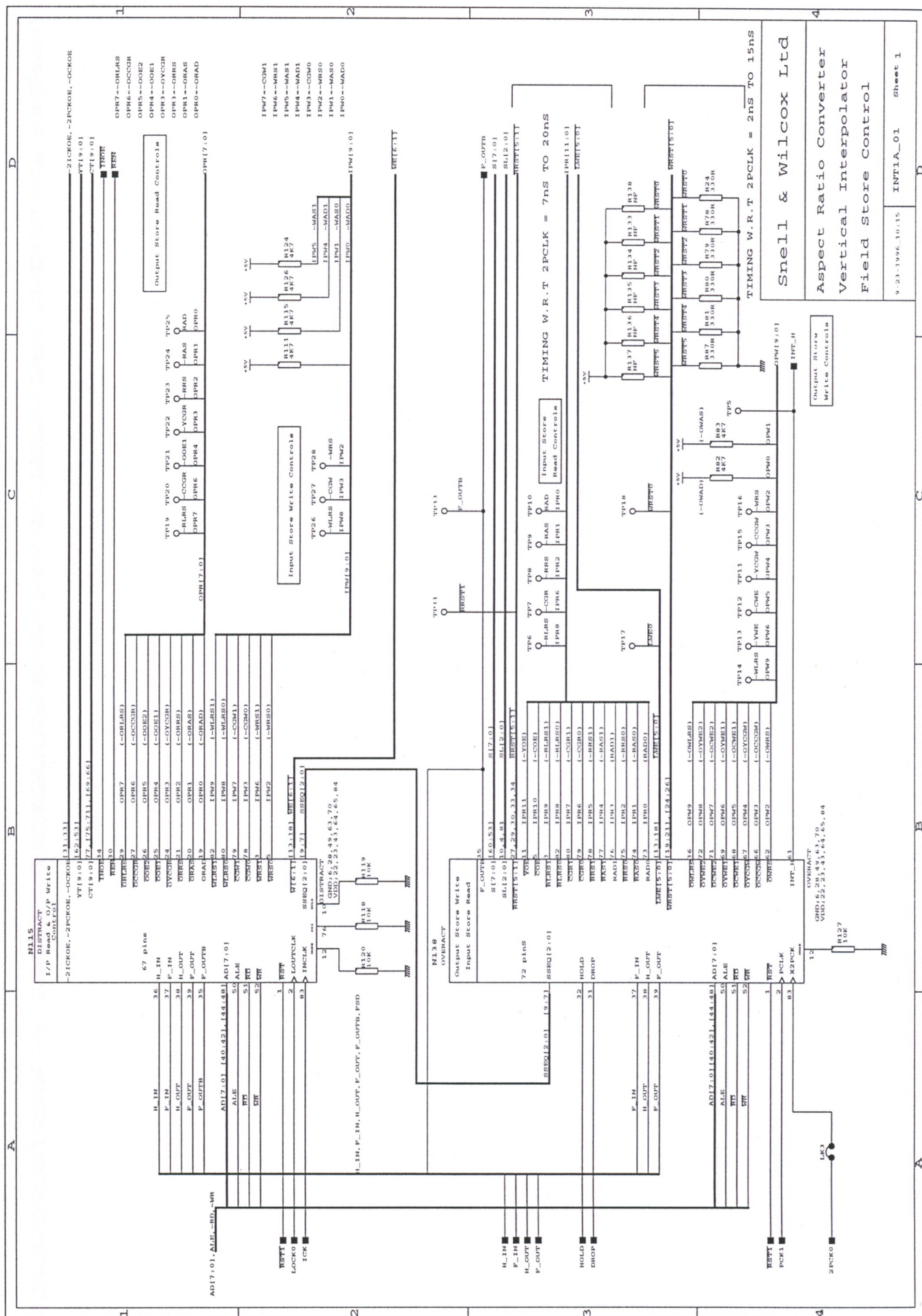


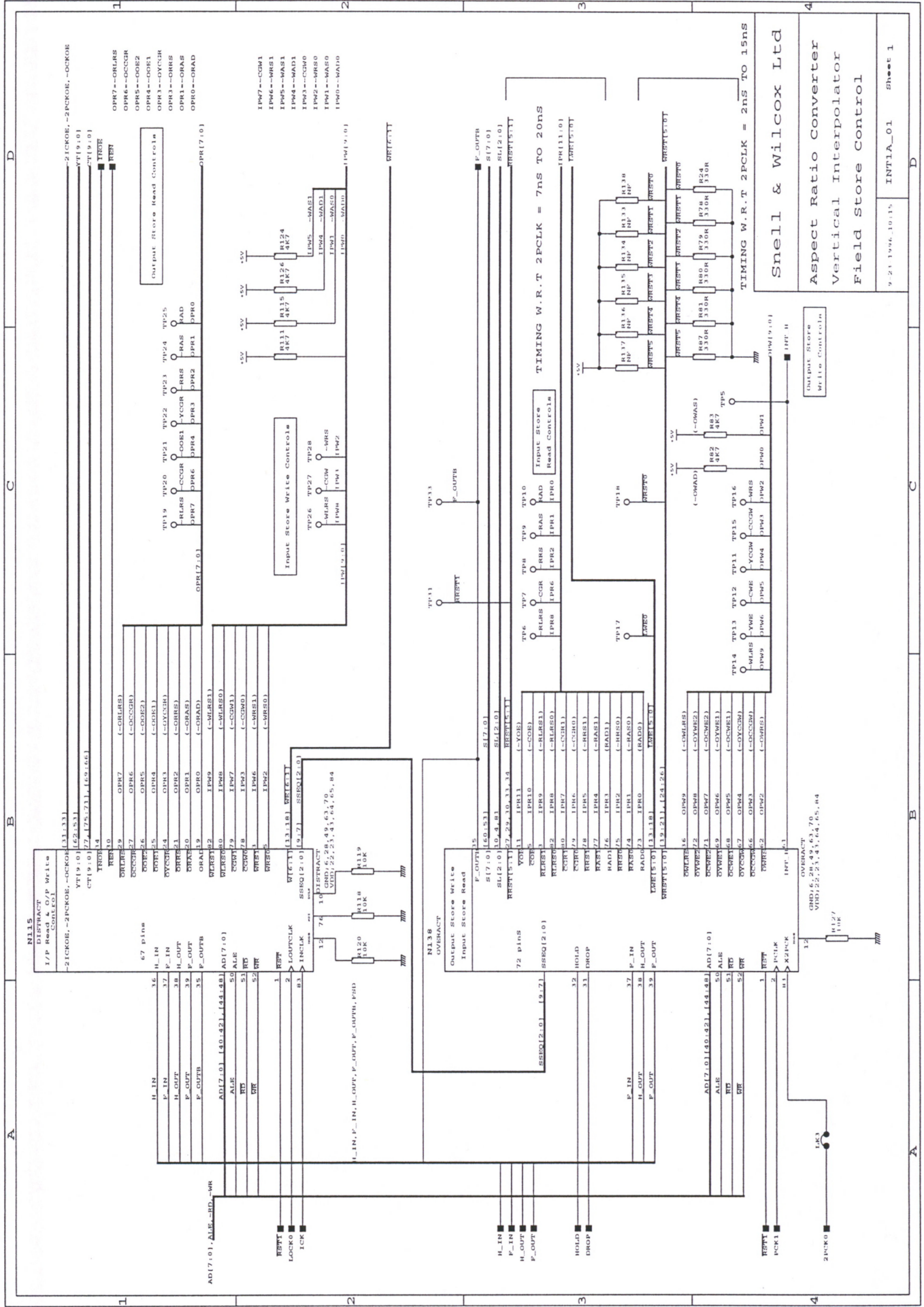


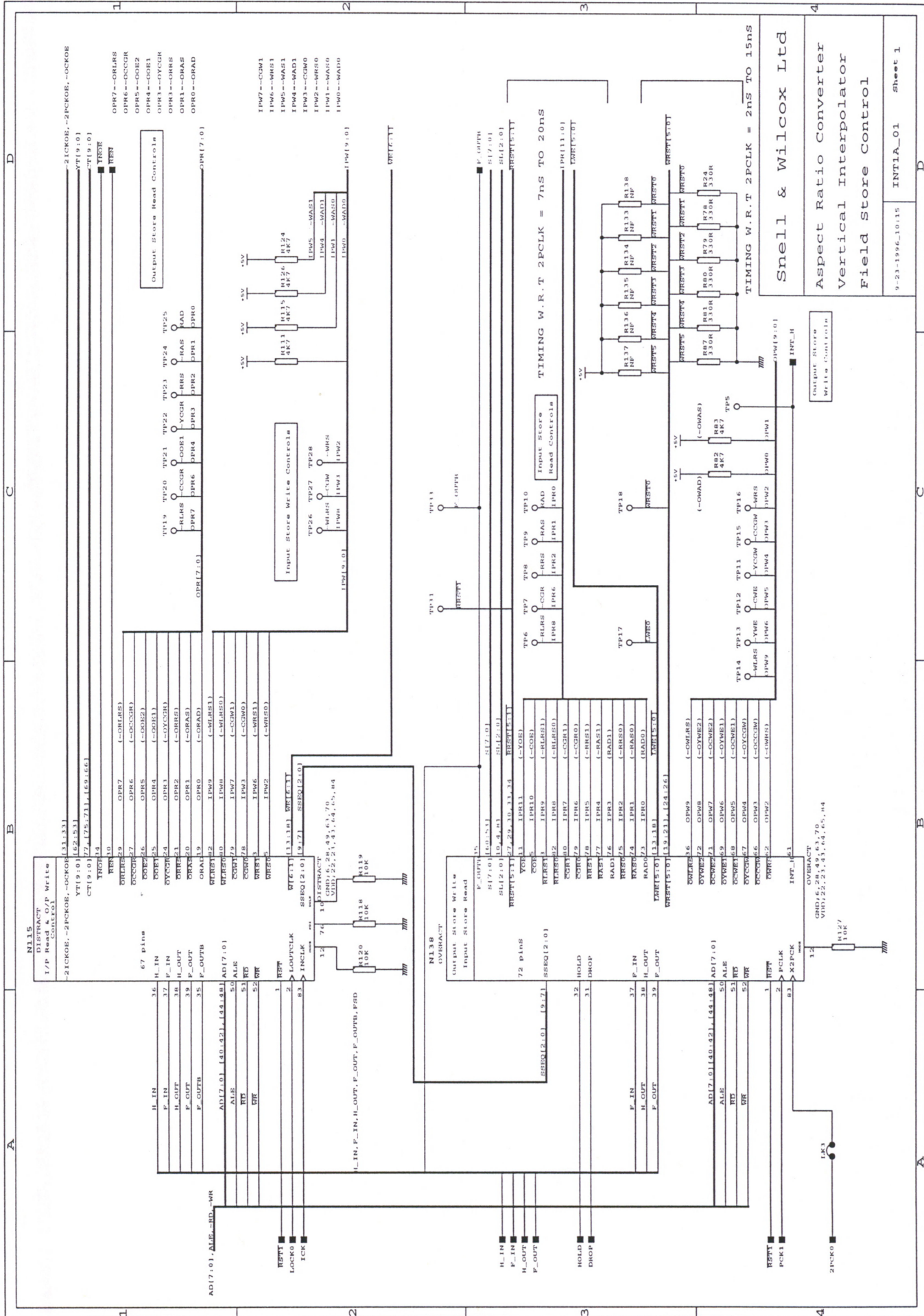


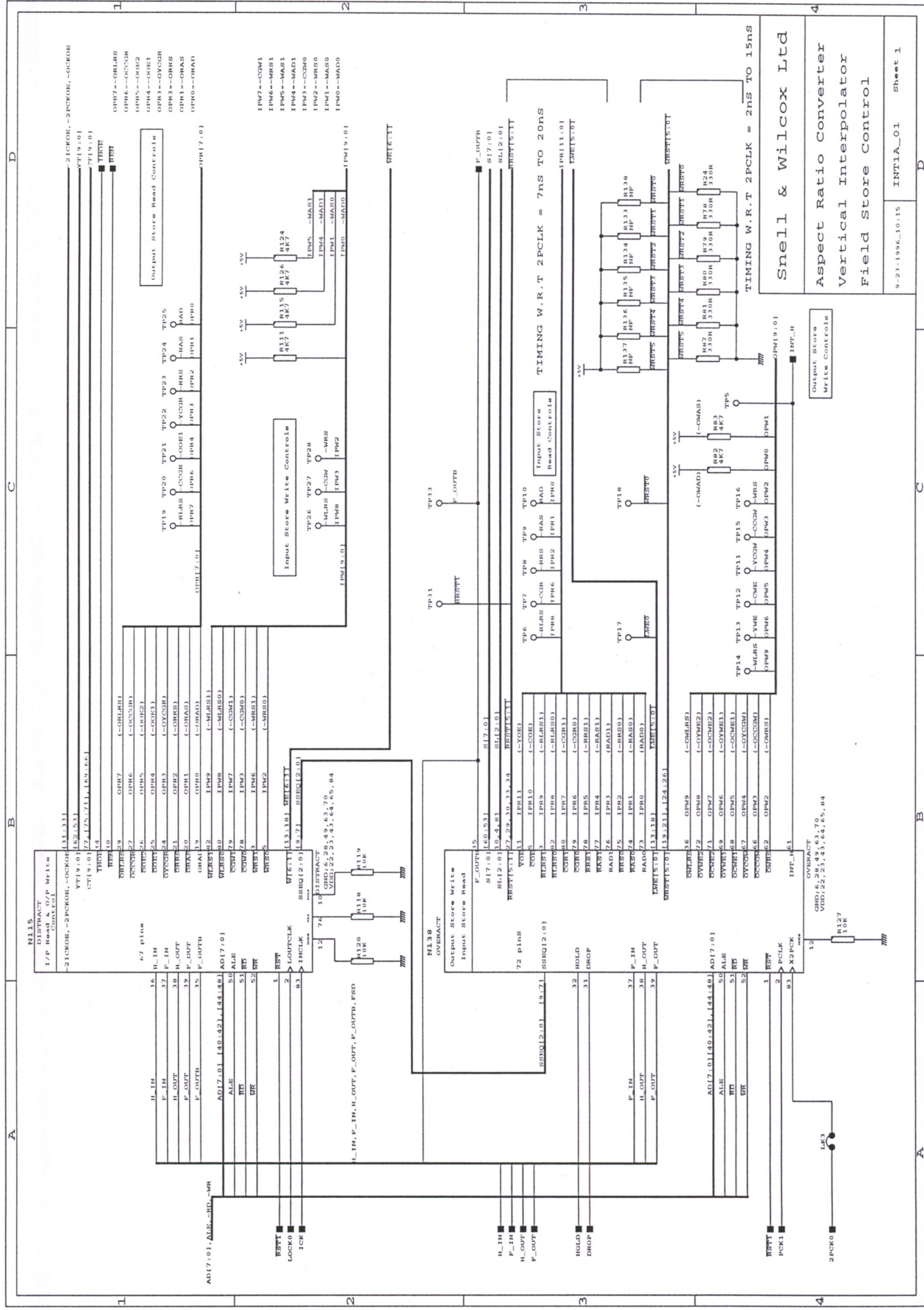


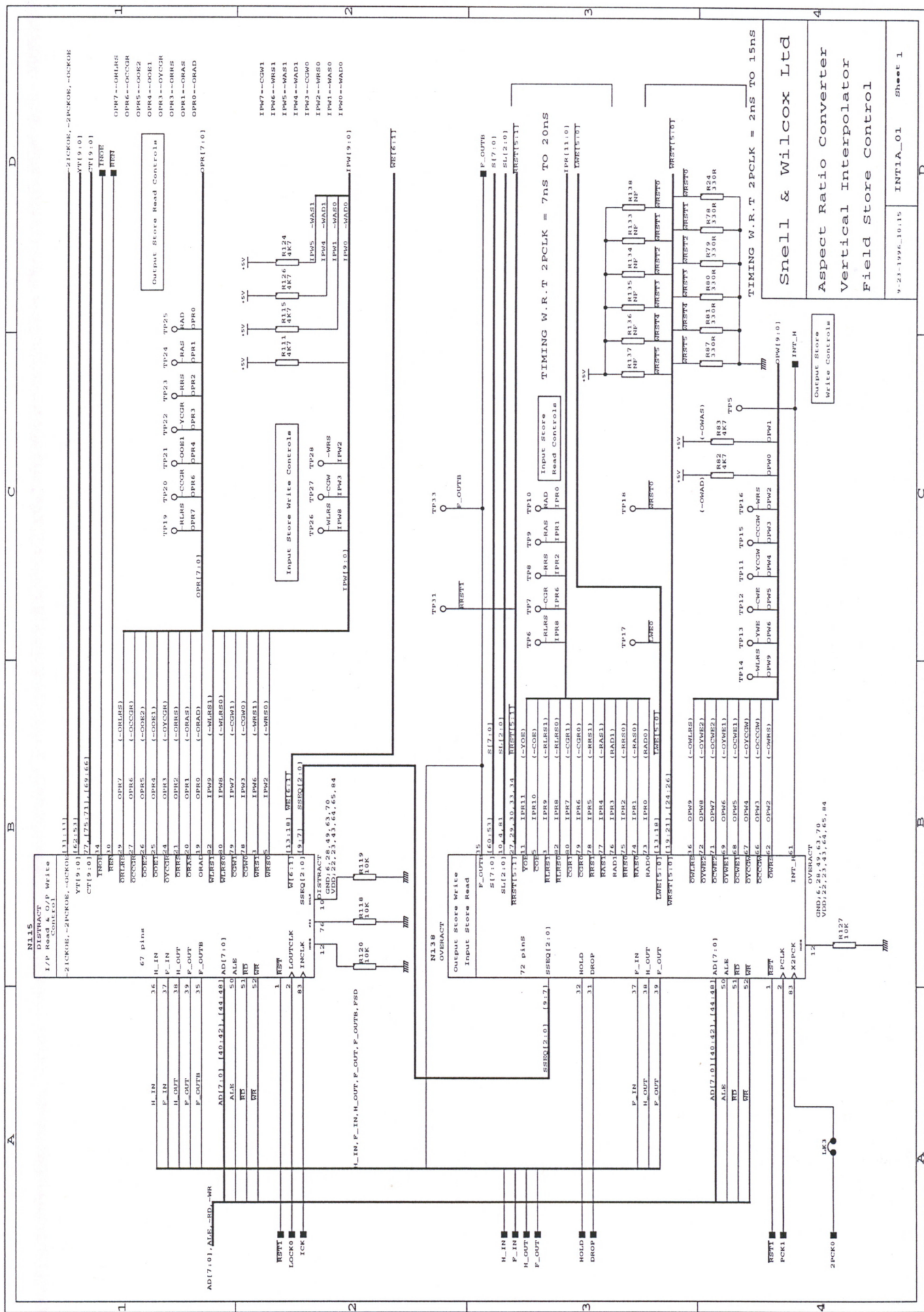


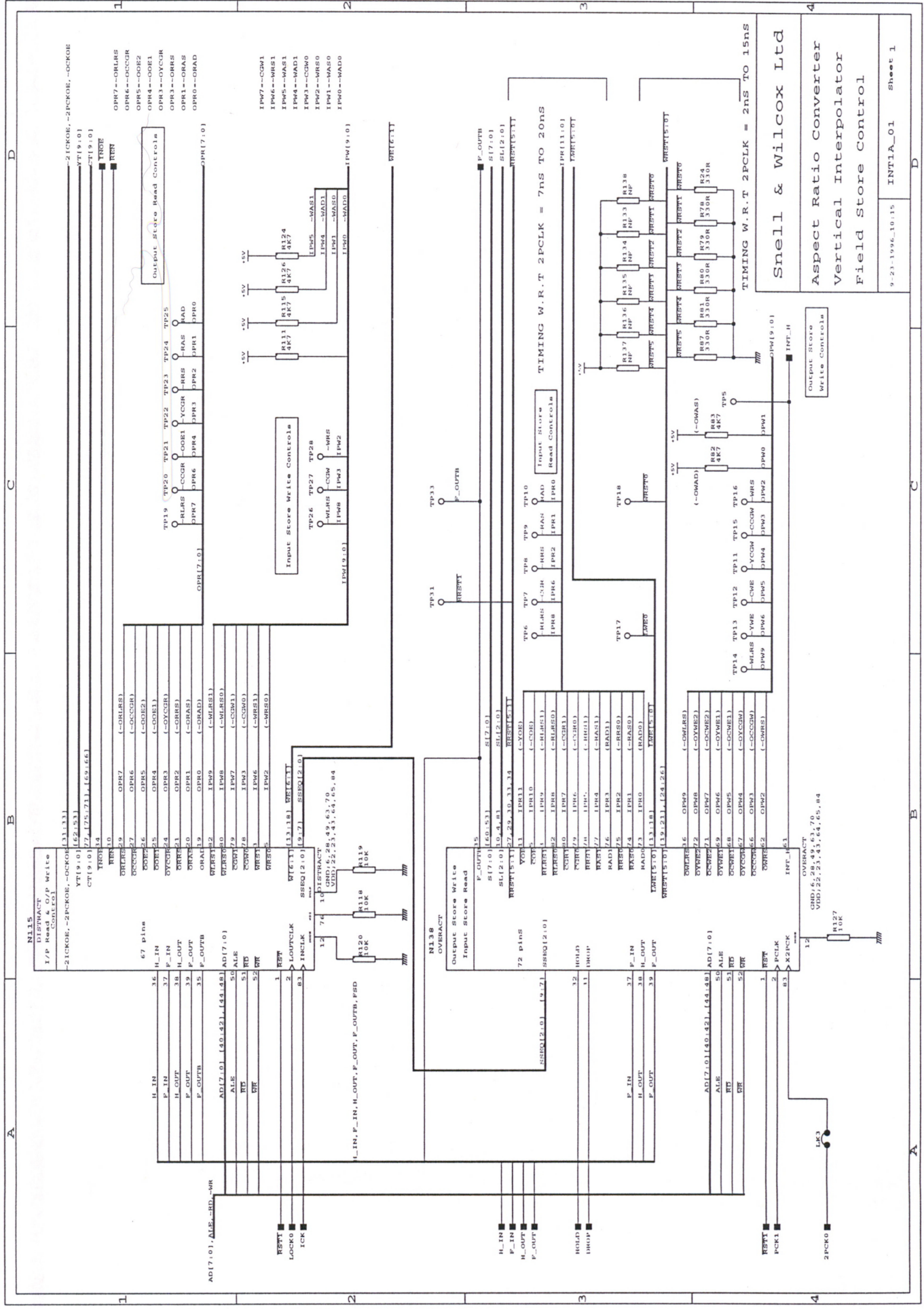


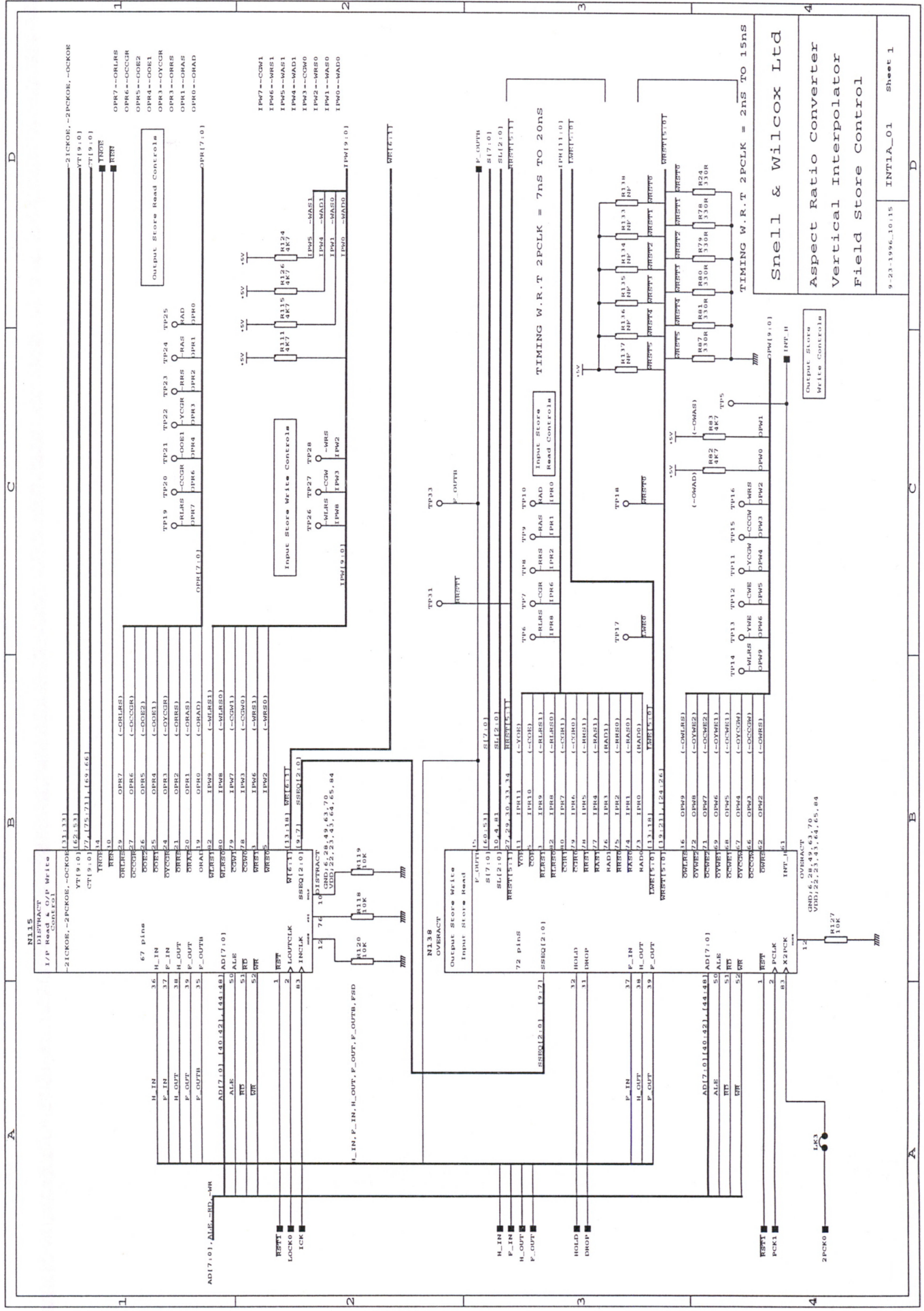


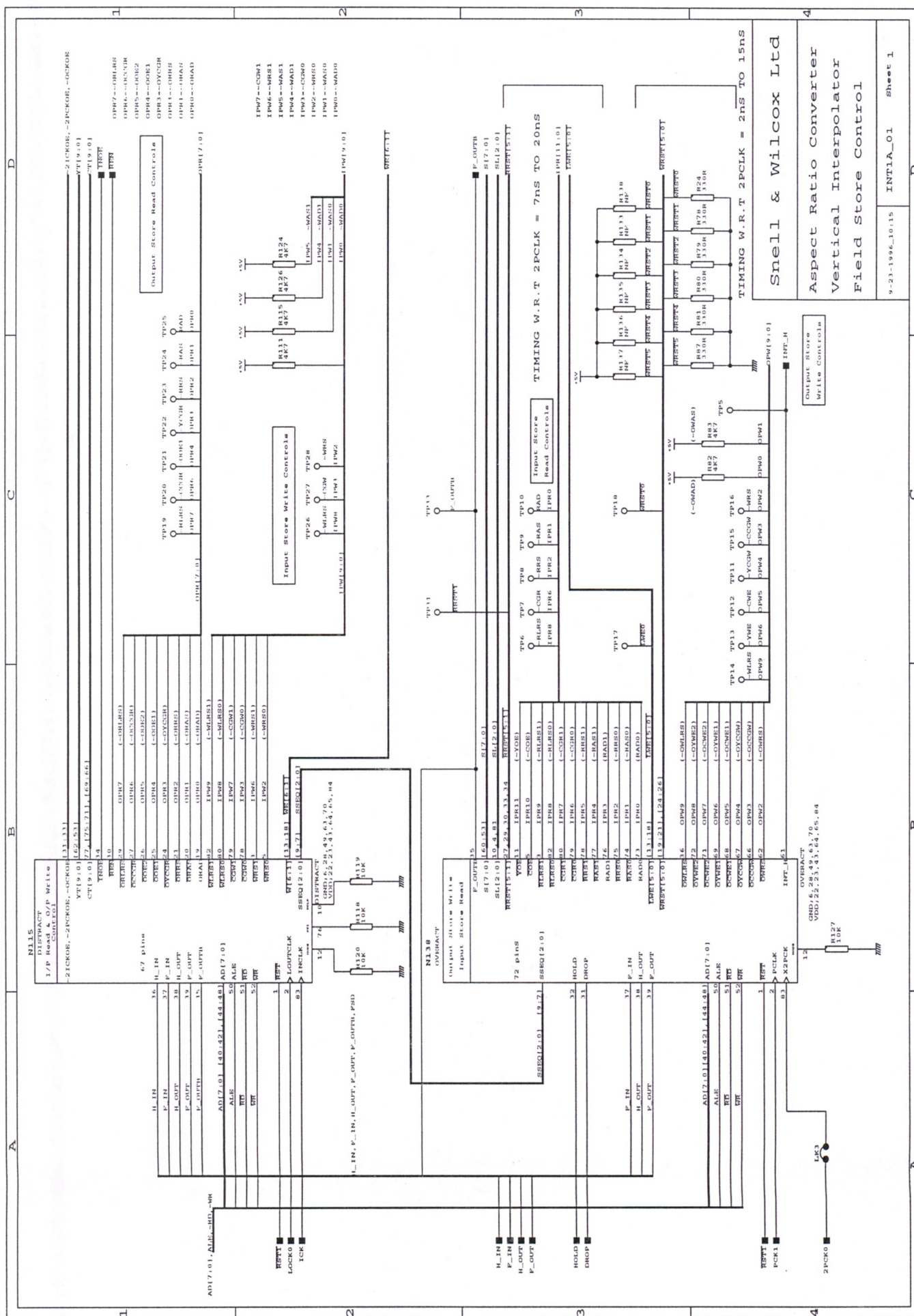


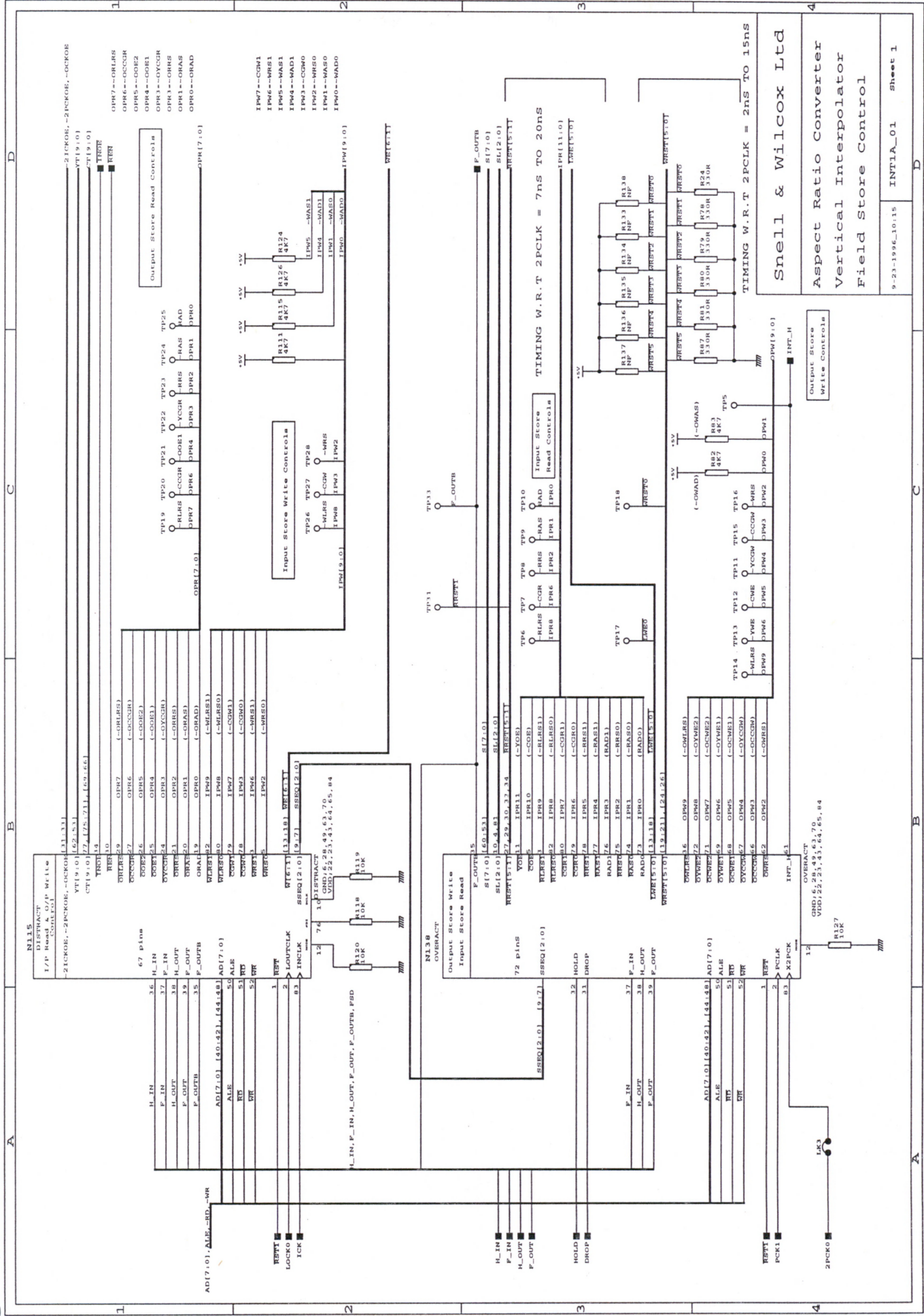


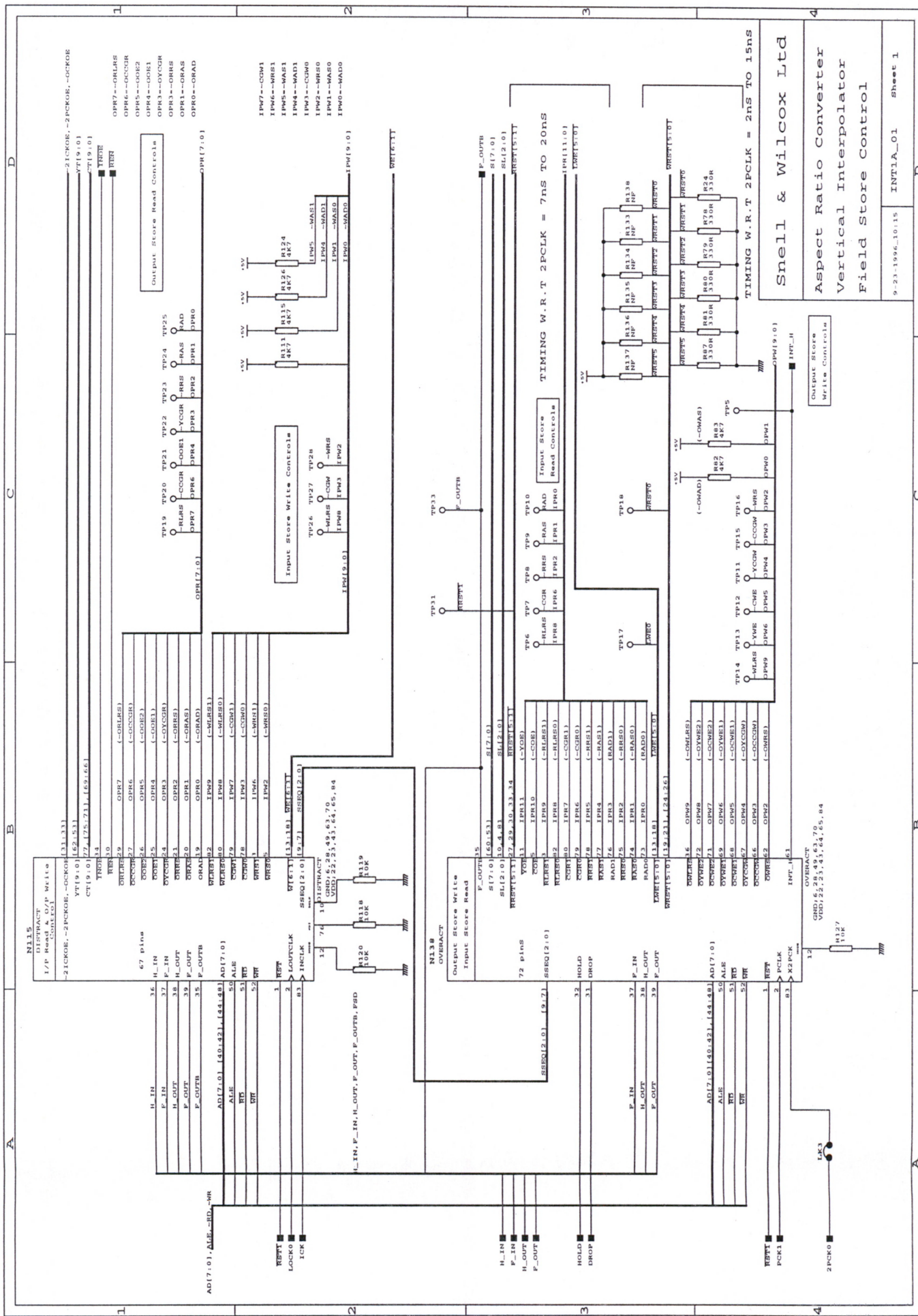












Maintenance

DISASSEMBLY

Access to the sub-assemblies of the ARC 150 is very easy and these minimal instructions are all that is required.



ENSURE THAT AC POWER IS REMOVED FROM THE UNIT BEFORE DISASSEMBLING IT.

MAINTENANCE SHOULD ONLY BE CARRIED OUT BY SUITABLY QUALIFIED PERSONNEL.

Removal of Card Assemblies

To gain access to the plug-in cards, lift up the levers at right and left of the front panel. hinge the panel down and then pull it out on its bottom slide panel. The location of the cards is shown in Section 3.

To remove a plug-in card, pull on the coloured PCB extractors at both sides. When refitting ensure that the card is pushed fully home.

The optional GPI Interface card is attached to the socket on the inside of the rear panel. To gain access, remove the top cover of the unit (14 screws).

Access to the Power Supply Assembly

To gain access, remove the top cover of the unit (14 screws). The power supply is retained in position by three screws on the underside of the unit.

ADJUSTMENTS

The ARC 150 has very few adjustable items and those are unlikely to need regular setting.

Equipment Required

Oscilloscope, dual channel, with a measuring accuracy of 2% or better. Also D-A converter input.

Cable simulator.

Extender card.

Serial digital monitor

Maintenance

Procedure - Output Interface Card

There are two adjustments on this card, one sets the free-running frequency of the input serial digital interface and the other sets the free-running frequency of the reference crystal.

In both cases mount the ARCOPI2A card on the extender card and then proceed as follows:

Serial Interface Frequency.

1. Connect a digital signal source (off-air for example) to the D1 serial input connector via a cable simulator.
2. Connect a serial monitor to the active loop connector on the rear panel.
3. Switch on, if no picture appears on the monitor, adjust RV5 until it does. Increase the cable length until there are a significant number of errors visible and then adjust RV5 for minimum errors.
4. Switch off and fit the card back in the unit.

Note that RV6 is not active in the current system.

Reference Crystal Frequency. This is set by comparing its frequency with a known good source.

1. Connect a convenient source of line rate to one input of an oscilloscope.
2. Connect the second input of the oscilloscope, via a D-A converter, to one of the digital outputs on the rear panel and to the input signal.
3. Switch on, from the menu set the Genlock source (Ref Input) to Free Run, and adjust RV9 until there is minimum slippage between the two signals.
4. Return the Genlock source (Ref Input) to the desired setting. Switch off and fit the card back in the unit.